

Mining in Turkey

A country thirsty for its own mineral reserves

TABLE OF CONTENTS

Introduction.....	p40
The Reformed Mining Code.....	p42
A Diverse Marketplace.....	p44
Interview with Minister Taner Yıldız.....	p45
Gold: Turkey's Glittering Treasure.....	p46
The Base Metal Deficit.....	p51
Coal for Energy Independence.....	p58
Industrial Minerals: The Boron Country.....	p61
An Increasingly Solid Supplier Base.....	p62
Closing the Investment Gap.....	p65

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Cover photo: Spektra Jeotek's rig (Courtesy of Spektra Jeotek)

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Introduction

Turkey's move to unleash its mining potential



View of a nickel open-pit mine. Courtesy of Photo courtesy of Fe-Ni Mining.

At first glance, Istanbul seems to have changed very little since the time of Ara Güler's black and white photographs. Its streets are still crowded and chaotic, and its wooden houses as neglected as the camera of Güler, "the eye of Istanbul," captured them 50 years ago. Despite the appearance, however, things have changed dramatically. Istanbul has become a 17 million people megalopolis with a brand-new metro system, two bridges stretching between Europe and Asia, a vibrant service sector, real estate developments springing up on every available piece of land, shopping boulevards packed with the glittering windows of international boutiques and 35 billionaires living in its yalis (waterfront villas) along the Bosphorus.

Over the last 20 years, meanwhile, Turkish cities such as Balıkesir, Bursa, Denizli, Gaziantep, Kahramanmaraş, Kayseri and Konya have become important business and industrial centers. Ankara is no more the provincial town that was despised by international diplomats in the 1920s, but a dynamic political capital with a population of 4 million.

Since Turgut Özal opened up the country to private and international investment in the 1980s, Turkey has been growing at impressive rates. Neither the domestic financial crisis of 2001, nor the more recent

global financial crisis managed to invert this trend, even if they did take some toll. The country ranks 17th in the world in terms of nominal GDP and Prime Minister Tayyip Erdoğan has vowed to make it one of the 10 biggest economies by 2023, the 100th anniversary of the Turkish republic.

Turkey's mining industry has gone through the same dramatic changes. Only 15 years ago, 85% of the mining operations were controlled by the state; today the ratio is reversed. Overloaded with cash flows predominantly proceeding from the construction sector, the so-called "Anatolian Tigers" have diversified into the mining sector by making the most out of the liberalization process. At the same time, Erdoğan's nine-year, investor-friendly tenure paved the way for international mining companies to increase their exploration efforts across the Anatolian peninsula, a varied, rich, but largely unexplored geological setting.

Turkey abounds with precious and base metals and it also sits on large industrial mineral deposits such as boron. Overall, the country ranks 10th in the world for the mineral variety of its underground resources: 50 different minerals are found in economically adequate quantities, while another 27 types have been discovered but lack the quantity or quality to be commercially exploited. Booming commodity prices have recently

augmented this mineral potential. As return rates on mining operations have dramatically bounced back following the global financial crisis, exploration activities have intensified and lower-grade ores are increasingly mined through sophisticated technologies.

Engineering and Mining Journal and Global Business Reports first published a report on Turkish mining in March 2008. Back then, we reported on a growing sector with plenty of potential for new discoveries. The market had both the opportunities and challenges that are typical of an emerging sector within an emerging economy. On the one hand, a mineral-rich land offering huge space for discoveries after years of state



Ümit Akdur, chairman, Turkish Gold Miners Association.

control had left it poorly explored; on the other hand, the sector lacked a reliable supplier base and a skilled workforce, and was tied down by a developing but still complex legal framework. In the case of the latter, the instance of Kışladağ is emblematic. The gold mine, which the Canadian company Eldorado Gold had equipped to process 10 million mt/y of ore, saw its permits were abruptly revoked over doubts regarding its environmental impact assessment (EIA).

Four years later, things have improved. Kışladağ is back at work and Turkey has quickly become Europe's largest gold producer with an annual output set to breach 25 mt in 2011. After a severe financial crisis forced the adoption of emergency reform measures in 2001, the national economy grew at a healthy average of 4.8% per year between 2002 and 2010. The global financial crisis took its toll in 2008 and 2009, but the resulting recovery saw Turkey posting a 2010 economic growth of 8.9% — very close to that of China and India. Early projections by Turkey's Deputy Central Bank Governor Mehmet Yörükoğlu, put the growth rate for 2011 at 7%. While European countries are trapped into a spiraling sovereign debt crisis, Ankara is following through its plan to storm into the cherished club of the world's 10 largest economies by 2023.

The mining sector could not avoid the 2008/2009 slowdown, with several international investors putting development projects on hold due to the disappearance of funding. However, as soon as the global economy started to recover and commodity prices began their upward trend, mining projects were back on track, largely supported by international capital. After decreasing for two consecutive years, foreign direct investments in the Turkish mining sector (not including investments through share purchases) bounced back vigorously in 2010, reaching \$195 million.

In gold mining alone, three new mines have opened in the last couple of years and several projects are due to be fully developed in the coming years. International investors showed their interest in the recent developments in Turkey's gold mining by subscribing 40% of the initial public offering (IPO) of Koza Gold, the sole local gold producer on the Istanbul Stock Exchange. Overall, investors laid down a total of \$436 million to subscribe 30% of Koza's capital, giving the company, which at the time was producing around 230,000 oz/y of gold with further resources for 8.1 million oz, a market value of \$1.45 billion.

Meanwhile, the Turkish government paved the way for new investments by amending the mining code in 2010. The new rules focus on making exploration campaigns more effective and lessening the bureaucratic red tape surrounding mining activities. The reform quickly made its mark on the industry by discouraging license holdings for trading purposes and unleashing new "serious" exploration campaigns.

According to the General Directorate of Mining Affairs (MIGEM), the number of total licenses (active and inactive) has dropped to 32,000 from 45,000 since the reform was approved. At the same time, the number of companies, both national and foreign, exploring for gold increased to 26, as of October 2010. Before the amendments in June 2010, there were only nine companies searching for gold. More are sure to come in 2012, when Ankara will tender more than a thousand new mining licenses.

Although this is all resulting in a steep increase of mining activity in Turkey, the overall value of mining and quarrying output is still low, equalling a mere \$15.3 billion and representing just 1.4% of the national GDP. A modest contribution compared to developed countries such as Germany (4%) and the U.S. (4.2%), let alone mining powerhouses such as Australia (8.7%) and Canada (7.5%).

Turkey adds little value at the end of the mining value chain: the country has a very limited processing capacity. There are just a handful of metal, ferrochrome and ferromanganese smelters across the country — and it is a net importer of refined metals and alloys such as copper and stainless steel. The country also imports large amounts of hard coal to feed its energy demand. As a consequence, coal, metals and alloys imports are contributing to Turkey's growing current account deficit. If Turkey wants to reverse this trend and capitalize on its mineral potential, it needs far more capital.

"We need more international companies coming over, meaning more capital for exploration activities. According to our estimates, Turkey's gold mining receives no more than \$150 million in foreign investments every year. That is not enough to completely unfold the sector's potential," said Ümit Akdur, chairman of the Turkish Gold Miners Association.

Beyond the gold sector, there are several companies that have recently completed feasibility studies for opening mines as well as processing plants for ferrous, non-ferrous and industrial minerals. They are all searching for the finance needed to follow these projects through.

At current commodity price levels, the potential return on investment could be very high. For Güven Önal, a professor of geology at Istanbul Technical University, fresh capital would unleash Turkey's mining potential and increase its share of the national GDP to 4%. "In 10 years, \$30 billion of investments would lead to \$400 billion worth of mineral production," he said.

This report will serve as an update on the state of development of mining in Turkey, on the recent discoveries and on the potential that still lies untapped underground, waiting for the capital able to activate the drilling rigs needed for its exploitation.

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The Reformed Mining Code

The reform addressed some of the weaknesses that had weighed down the development of the sector in the previous years.

Following the Turkish Constitutional Court's decision to cancel Article 7 of the mining code regarding the regime regulating environmental permits, the government drew up a set of amendments that were accepted and passed by Parliament in June 2010.

The basic principle of the Turkish mining code was left untouched, and minerals remain under the ownership and sovereignty of the state, which issues mining licenses for a defined period of time. The main focus of the new rules falls on exploration activities. It was previously a point of contention in the industry that there was no rule that prevented so-called *çantacı* — literally 'someone that stores something in a bag' — from collecting mining licenses just to sit on the land with the hope of eventually reselling it at a profit. License-holders were not asked to invest any money on the land and could mask their intentions by producing unreliable reports. Malcolm Stallman, re-

gional exploration manager of Centerra Gold said: "It was like buying a lottery ticket for a few hundred Turkish liras with the hope of selling it for millions later on."

The government put an end to this practice by imposing financial constraints for any potential explorer. "If a company wants to carry out exploration activities, it has to prove it has the financial ability to do so, otherwise it will not be permitted to explore," said Mehmet Üzer, general manager of the General Directorate of Mineral Research and Exploration (MTA).

The new rules also introduced a three-step exploration period: a pre-exploration period; a general exploration period; and a detailed exploration period. Throughout the entire period, authorities are expected to check on-going developments and whether mining companies are carrying out their exploration campaigns in an effective way. If they fail to live up to these criteria, their

licenses will be revoked. This license regime does not hold for mining production belonging to the so-called "Group I" (sand, gravel and clay) and "Group II" minerals (aggregate, marble and natural stones) where no exploration phase is required to access an exploitation license.

The amendments also clarified the liability terms under which both the licensee and the sub-licensee/operator are now "jointly and severally liable for all damage caused by mining activities," said Andrew Ridings, an analyst from Holman Fenwick Willan, in a recent analysis of the reform.

Reforms also addressed the historically poor conditions of the health and safety of miners in Turkey. According to a parliamentary report issued in May 2010, Turkey has the highest rate of fatalities in mining accidents in Europe. By tightening the HSE requirements, including requiring that professional mining engineers and technical staff are present at mining facilities, this is expected to be reduced. A final important change regards the role attributed by the law to the Ministry of Energy and Natural Resource which held regulatory powers under the previous regime, but is now only responsible for implementing and administering the new laws.

With these changes, the Turkish mining code certainly comes closer to international standards. In the eyes of operators used to dealing with mining laws throughout the globe, there are some gaps that still need to be closed.

"The maximum size of Group IV tenements is still small — 2,000 hectares — and tenements can assume any shape. Because of this, putting together several licenses to form a large land package can be very difficult. Turkey also lacks a so-called 'open file' information system. Exploration companies that have been granted a license cannot access the results of the exploration work that someone may have been carried out on the same piece of ground in the past," said Centerra Gold's Stallman.

There is also room for improvement in the reporting system, although MIGEM is in talks with CRIRISCO, the Committee for Mineral Reserves International Reporting Standards, to push through new amend-

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ments which will force the introduction of international reporting standards.

Companies interested in acquiring licenses in Turkey must pay attention to the potential underground resources, but also to the surface area. Forests and archaeological sites are scattered over the country and specific laws grant them particular protection. For instance, no mining operations can be established within a distance of 3 km from an olive grove. As the amendments approved in 2010 did not change this state of affairs, a bill has recently been drafted to loosen the rules. Legal sources questioned on the issue showed skepticism about it being pushed through due to the influence and opposition of the farmers' lobby. Tap water reservoirs around mining locations are also granted special protection. A mine operating company is strictly prohibited from detonating explosives inside a mine unless they are situated at least 2,000 m from any reservoir in the vicinity. Companies will also have to act in accordance with environmental impact reports in the method of extraction for mines located 2,000 or more meters from a reservoir.

The auctioning process

The new rules pertaining to exploration activities will be tested soon. As the old mining code became increasingly unreliable, exploration license auctions were suspended. They will soon resume as a follow-up to the recent reform.

The government has called a series of auctions to tender 1,252 "Group IV" licenses (which include precious and base metals) via consecutive closed and open bidding processes. These will be held between January 2012 and May 2012. Both local and international companies have shown substantial interest in the auctions and geologists are at work to identify the opportunities worth a bid.

Although the resuming of the tendering process met with the approval of mining companies, it is proving to be controversial concerning the role the MTA will play in it. The state's exploration body has been granted the right to review the licenses to be tendered beforehand. Some fear this will make the overall process less transparent and ultimately less attractive for serious mining companies.

Sabri Karahan, who before founding Dama Engineering spent over 35 years working for both state-owned and private mining companies in Turkey, said: "The MTA will get away with the juice and the private sector will be stuck with the rest."

"The MTA can apply for licenses close to known basins and the applications have to be bound to particular projects. During their exploration activities, if they find an exploitable orebody, they give the license back to us for tendering. As a consequence we can raise two to three times the amount of tendering revenue with the contribution of MTA," said Hamdi Yıldırım, general manager, MIGEM.

Apart from this particular issue, the overall reaction of the industry to the 2010 reform has been positive and there is a clear understanding that the government is putting efforts into attracting investment to the mining sector. "Rules have become clearer and we know better what is expected of us. There is little room left for interpretation now," said Iain Anderson, managing director of Inmet Mining's Turkish operations, Inmet Çayeli Bakır.

The industry is now awaiting specific regulations to follow the amendments that will put every details in its proper place.

As a collateral benefit, international mining companies operating in Turkey can enjoy one of the most competitive corporate tax systems among OECD countries. Apart from the specific royalties applying to mining operations (the royalty for gold, silver and platinum has been increased to

4%, and the royalty for dimensioned and natural stones, which are processed into a final product in the facilities of the license holder, has been reduced to 1%), the basic corporate income tax rate levied on business profits is 20%, while dividends are subject to 15% tax. In regards to VAT, gold and silver exploration activities are exempt from any duty. Stamp duty applies to a wide range of documents, including contracts, agreements, notes payable, capital contributions, letters of credit, letters of guarantee, financial statements, and payrolls. Stamp duty is levied as a percentage of the value of the document at rates ranging from 0.165% to 0.825%.

The government is also using incentives to spur companies to overcome the actual weaknesses of the industry which include the small amount of deep underground operations and an overall limited ore processing capacity. For those mining companies that 'create additional value by processing the minerals,' and those that mine underground, royalties are 50% cheaper.

Ankara is trying to foster developments along the entire value chain of the mining sector: the exploration activities regime has been made more effective, while costly underground operations and processing facilities are being supported through incentives.



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A Diverse Marketplace

The spectrum of companies operating in the Turkish mining sector is highly varied and reflects the historical stages of development the industry went through.

It is no surprise that the origin of Turkey's modern mining sector dates back to Mustafa Kemal Atatürk, the founder of the Republic of Turkey. Atatürk's vision for the national economy embraced all sectors, and mining was no exception. In the eyes of the "great leader", Turkey's mineral reserves had to be centrally managed to better serve the needs of the country's heavy industry. To follow through his vision, he founded the MTA to carry out exploration programmes throughout the country and Eti Bank to follow up MTA's discoveries by establishing mining operations. This setting lasted basically untouched for decades, with Eti Bank remaining in charge of most of the mining operations going on in the country up until the 1980s.

Things changed with the election of Turgut Özal as prime minister. After years of instability marked by conflicts between right and left-wing parties culminated in a military coup in 1980, Özal entered the fray by founding Anavatan Partisi – the Motherland Party – and winning the first democratic election after the military regime. As soon as he rose to power, Özal started opening up Turkey's economy and unleashing the potential of the private sector. As part of his set of reforms, a new mining code was approved in 1986. That first step kicked off the privatisation process that, to different degrees of intensity, has lasted until today.

Following the 1986 mining code, Eti Bank was broken up into smaller companies to be sold to private enterprises. Most of them would end up in the hands of established Turkish conglomerates, which have recently risen to prominence as the Anatolian Tigers. These included the Cengiz Group (Eti Aluminium and Eti Copper) and the Yıldırım Group (Eti Chrome), the Ciner Group (coal and soda ash concessions), Dedeman (chrome ore, lead and zinc) and the Koç Group (iron ore and coal). These conglomerates, whose success is primarily rooted in construction, finance and media empires, are now the largest mineral producers in the country. They have capital to invest, but may lack the expertise to develop mining operations. For this reason, they are increasingly relying on local service and equipment suppliers, creating room for developments among the mining industry's supplier base. For the time being, only Eti Maden (boron), TKI (lignite) and TKK (hard coal) have survived as state-owned mining companies since Eti Bank's original break-up.

Alongside local conglomerates, Özal's mining code and its successive reforms (2004, 2010) also lured international investors into the Turkish mining sector. They mainly focused on developing precious metal greenfield projects - Canadian Inmet's takeover of operations at the Çayeli Bakır copper mine is a rare exception.

Despite significant geological potential for precious and base metal mineralization, at the time of Özal only insubstantial amounts of gold or silver had been produced in the recent history of Turkish mining. International mining companies such as Cominco spotted the opportunity and stepped into Turkey looking to uncover its most precious mineral wealth. They kicked off a successful process and today Turkey can boast Europe's largest gold mine – Canadian company Eldorado's Kışladağ mine (located in the province of Uşak, some 400km South-West of Ankara) with reserves of 10,231,000 oz at 0.74 g/t – and other world-class deposits such as Denver-based Alacer Gold's Çöpler mine (Erzican, 550km East of Ankara). International companies also developed Ovacık (Izmir, on Turkey's Aegean coast), the first active gold mine in the country, although Frontier Pacific sold this asset to Koza Gold in 2005. Inspired by these success stories and by booming gold prices, dozens of mining ventures are now trying to uncover other world-class gold deposits. Foreign companies, predominantly from Canada, Australia and Britain, are now carrying out exploration programmes throughout the country.

Alongside local conglomerates and international investors, the Turkish mining industry is being increasingly populated by a plethora of small local players looking for the enticing profits offered by exporting chrome ore and iron ore outcrops to China and other countries. They suffered serious setbacks in 2008, when the global financial crisis deflated the commodity bubble on which they rode, but they are now back on the ground trying to get the most out of the recent recovery in ferrous mineral prices.

This variety of active players results in a vibrant mining sector that is quickly growing and determining the rise of a local supplier base. Doubtless, gold mining is showing the highest rate of growth in terms of investments as well as of production.

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“Our final aim is to transform Turkey”

Taner Yıldız, the Minister of Energy and Natural Resources explains what the government is doing to uncover Anatolia’s mineral resources.

Why is mining so important for Turkey?

Mining is important for Turkey for several reasons. The mining sector provides the economy — mainly the industrial sector — with necessary raw materials. Besides, it fosters the development of rural areas through new investments in infrastructure and job opportunities. It also helps introduce in those areas new technologies and marketing and financing methods.

What is the current state of development of the Turkish mining sector?

The Turkish mining sector’s total value of production topped \$10.5 billion in 2010. It was \$2.6 billion in 2003. Mineral imports grew to \$3.7 billion in 2010 from \$684 million in 2002.

Most of Turkey’s mineral reserves are buried underground. What is the country doing to uncover that wealth?

Exploration activities can be divided into governmental and private operations. The governmental exploration activities are carried out by the General Directorate of Mineral Research and Exploration (MTA). At the same time, a contractual system enables private companies to bring forward their exploration. Recent figures give the idea of the impact the incentives put in place to spur drilling operations: public and private ventures drilled 1 million m in 2010, a tenfold increase compared to 2002.

The government pushed through a reform of the mining code in 2010. What innovations were introduced?

The mining code was first reformed in 2004. As a result, the interest in the sector increased. Later on, following the Constitutional Court’s decision to cancel provisions of the national mining law regarding environmental permits, uncertainties on how to get permits



for mining operations emerged. Therefore, it became mandatory to eliminate the legislative gap. There was a disequilibrium between the licenses granted and the number of new mining operations put in place. Licenses were being used for controversial purposes. To address these problems, the government passed a set of amendments to the mining law in 2010. With the final arrangements, 25% of the revenues proceeding from mining operations are used to fund infrastructure developments in the regions where the licenses are collected. At the same time, 50% of the fees paid for mining operations are invested to bring services to rural villages.

Is the government also supporting the development of a supplier base to the mining sector?

Currently, most of the equipment that mining companies need is manufactured in Turkey. This brings several advantages for operators: it reduces investment and operative costs by increasing the level of maintenance and making it easier to find spare parts.

Mining in Turkey is quickly developing. Within this context, what is the role the Ministry of Energy and Natural Resources wants to play?

The mission of the Ministry of Energy and Natural Resources is to realize a restructuring of the mining sector in order to achieve environmental-friendly and sustainable development. We also have to put in place contemporary standards in terms of job security.

By uncovering the country’s mineral reserves, our final aim is to transform Turkey from a country that produces and sells raw materials into a country that is industrially integrated and has a voice in the world market in terms of high-value products.

View of Ariana Gold’s Kızıltepe project area looking northeast.

Gold: Turkey's Glittering Treasure

With production at Eldorado Gold's Efemçukuru and Koza Gold's Kaymaz having kicked off in the second half of 2011, the sector is set to further boost its annual outcome.

According to the Turkish Gold Miners Association, overall 2011 gold production is expected to reach 25 mt/y, compared to 17 mt/y in 2010. In the long-term, analysts expect it to stabilize around 60 mt/y. This is a remarkable achievement for a country that, in its recent history, had not produced a single ounce until 2001, when the first gold mine, Ovacık, entered production stage. In 10 years, Turkey has established itself as the largest European gold producer by a wide margin — Sweden follows with 6.5 mt/y.

The country is now posed to further strengthen its leading position. With gold setting new records in the financial market, fueled by growing concerns over European and U.S. sovereign debt risk — spot contracts averaged more than \$1,550/oz in 2001 — development projects are already piling up. In the coming months, a number

of plays are due to reach production stage, while the processing capacity at some active mines will be further enhanced. In the words of a gold miner: "If you have something underground you have to develop it. And if you have already developed it, you have to double the processing capacity."

Besides, more discoveries are yet to come. Junior and mid-tier mining companies are scattered over the country looking for the next Turkish world-class deposit. The resuming of the license auctioning process will further intensify exploration activities. As long as explorers are able to access the capital markets to fund their exploration activities, rigs will be busy.

Growing processing capacity

All of the largest gold producers in the country are drafting plans to expand their produc-

tions. Eldorado is planning to invest \$354 million to double the processing capacity at its Kışladağ property. The open-pit gold mine, boasts combined proven and probable reserves of 10.2 million oz. Yearly production for 2011 is expected to swing between 270,000 oz and 285,000 oz. Despite a low gold grade (0.74 g/t) the company enjoys extremely low production costs, around \$360/oz in 2011, thanks to a heap leach circuit able to process 12.5 million mt/y and due to be raised to 25 million mt/y by 2014. Since last June, part of Kışladağ's leach pad capacity has been absorbed by the ore coming from Efemçukuru. This smaller underground mine has reserves of more than 1.5 million oz of high-grade gold (9.10 g/t). Mehmet Yılmaz, director of Tüprag, the 100%-owned local subsidiary of Eldorado Gold, estimates that total production will have reached 30,000 oz in the first six months through the end of 2011.

Denver-based Alacer Gold also has plans to update production at its Çöpler mine. Çöpler has reserves of 4.6 million oz at 1.5 g/t and Calvin McKee, Alacer Gold's country manager for Turkey, is confident he will soon be able to revise this figure upwards. Brought into production stage in December 2010, the mine's leach pad has delivered almost 50,000 oz per quarter and will end its first year at around 180,000 oz. McKee is committed to pushing the production even further. "We are pursuing a production of 250,000 oz/y," he said.

The company has mined only the oxides, but it also completed a pre-feasibility study for a sulphide processing plant and has initiated a complete feasibility study. "It should be completed by the end of 2012 and the plant should be in place by the end of 2014," said McKee. Overall investment will amount to \$400 million.

Turkey's Koza Gold is focusing on expanding mine-life at Ovacık. As the first Turkish gold mine to enter the production stage back in 2001, Ovacık has produced a total of 39.63 mt of gold. The mine's development was initially very controversial due to then-owner Newmont's attempt to introduce the first cyanide leaching in Turkey. As

Koza Gold

a leading Turkish gold producer



Koza Gold Corporation

Koza Gold is a Turkish company (formed 100% by Turkish capital) to explore and operate gold mines in the country.

Koza has already established itself as a leading Turkish gold-mining company, with an output of 256,000 oz in 2010 and 210,000 oz in the first nine months of this year.

Operating Mines

Koza already owns four operating mines. These comprise an underground mine at Ovacık, an underground mine at Mastra, an open-pit mine at Kaymaz and a mine at Çukuralan where both underground and open-pit mining methods have been utilised. Construction of the process plant in Kaymaz was finished in September 2011 and test production was started.

There are 2 pre-feasibility stage projects; Mollakara project, which lies near Agri in the north-east of Turkey, and Himmetdede in the central Anatolia.

Looking ahead

As of December 2010, Koza's gold resources reached to 10 Moz, and reserves of 2.1 Moz. An internationally accepted Competent Person's Report was prepared for this reserve/resource data. An intensive exploration programme is ongoing, led by an experienced team of geologists, to improve resource and reserve base.



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a consequence of environmental protests and legal challenges, the mine has operated only sporadically for years. Koza took over Ovacik in 2005 and soon afterwards a court overturned a previous decision to suspend production at the mine. As soon as production resumed, the company looked for satellite deposits that could feed the processing plant and expand the mine-life beyond initial projections. Today, the plant still has an output of 180,000 oz/y, and 80% of the ore it processes comes from Koza's nearby Çukuralan mine. Mine-life has been expanded beyond 2020. Meanwhile, Koza also brought to production the Kaymaz play last September — production there is expected to stabilize between 80,000 oz/y and 100,000 oz/y.

The cyanide debate

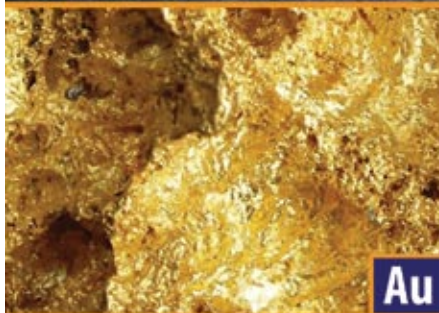
Despite the resuming of operations at Ovacik, the Turkish public is still very sensitive to cyanide usage in mining operations. Bora Arpacioğlu, managing director for Turkey of SRK Consulting said "Cyanide has not been well understood by the Turkish public. It has become a myth. But cyanide is used frequently in other industries here in Turkey and is not as well managed as it is in the mining sector. In the past there were no legal rules that could handle the use of cyanide. Now, a lot of environmental transposition from EU regulations has happened. Air quality and water quality regulations are in place, and there is a draft in parliament regarding the regulation of mining waste. With better regulations, things became clearer, especially in the legal arena. In the past people could bring companies to court very easily, now it has become more difficult. All in all, the general environmental regulations have improved, but still there is a stigma attached to the use of cyanide."

This stigma is one that mining companies have to address very thoroughly. "Gold mining is certainly a different type of mining: particularly due to cyanide, gold mining projects will get country-wide reactions and ministerial expectations are much higher — they will ask for specific studies, seepage models, transport models and so forth. There are two issues here. The first is to ensure that your EIA covers all of the necessary technical details; the other aspect is public relations. It should be the mining company that communicates in a meaningful manner to the affected public that they are doing all that they should," said Meryem Tekol, managing director of Golder Associates, a Canada-based company that specializes in providing environmental consultancy services. It launched its Turkish operations in 2006.

The next major mining story out of Turkey



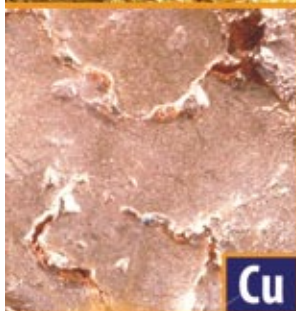
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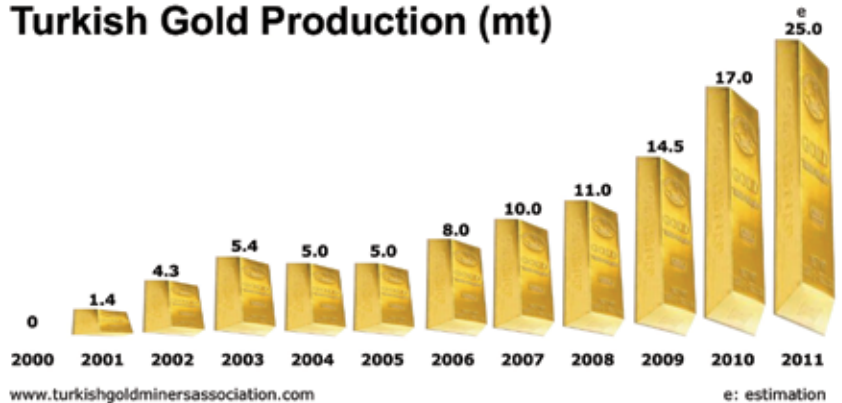
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The production stage

While gold producers are gearing up to enhance their production facilities, a number of exploration companies are set to bring their plays into production.

Canadian Aldridge Minerals is developing a 24 million mt polymetallic ore field (copper, gold, silver, lead and zinc) in Yenipazar, in the western part of Anatolia. Gold equivalent mineral reserves are currently just above 3 million oz, which could potentially make it the third largest mine in the country after Kışladağ and Çöpler. The ongoing exploration may uncover even bigger potential. "In a recent comparison of six diamond Reverse Circulator (RC) duplicate drill hole pairs, we found that the diamond holes reported on average 49% more gold, 42% more silver, and about 10% more base metal (copper, lead and zinc). We knew that RC-drilling loses metal and tends to understate the grades, but this discrepancy came as a surprise. The resources reported so far are almost entirely based on RC drill holes, and we are now considering additional duplicate diamond holes. The so duplicated RC-holes represent 70% to 75% of the current resource, which may well be upgraded similar to the increased metal recoveries found in the six diamond/RC duplicate pairs," said Serdar Akca, Aldridge's country manager for Turkey.

Turkish Gold Production (mt)

Aldridge Minerals is carrying out the definitive feasibility study (DFS) at Yenipazar and plans to complete it by late November 2012. The company is also obtaining good results on the metallurgical side. "We have made progress especially on gravitationally recoverable gold, which would improve the overall gold recovery significantly when compared to the recoveries used in the still current preliminary economic assessment," said Akca. Aldridge, which has a market capitalization of \$30 million, will have to invest around \$200 million to fully develop the site.

As another consequence of such high gold prices, smaller-scale projects have

also become economically viable. AIM-listed Ariana Resources plans to bring its Red Rabbit project into production by the end of 2012. "Our current JORC compliant resource report at the Red Rabbit project stands at approximately 448,000 oz of gold equivalent, with two key sectors under development: the high-grade Kızıltepe Sector and the heap-leachable Tavsan Sector. We are still exploring the Red Rabbit project area, and there is still potential to increase the resource base to more than 500,000 oz," said Erhan Şener, general manager of Galata Madencilik, the Turkish subsidiary of Ariana Resources.



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The company will need \$26 million to process 150,000 mt/y ore and reach a target yearly production of 20,000 oz over a mine life of eight years. Ariana Resources joined efforts with Turkish construction company Proccea to set up Zenit Madencilik, the joint venture that will be in charge of Red Rabbit's production. Zenit is committed to funding 30% of the \$26 million investment and is already talking to financial institutions to access credit lines for the remainder. "As long as gold prices remain at their currently high levels, we do not foresee that financing the project will pose a problem at all," Şener said.

Another AIM-listed company, Stratex International, is expected to bring its Inlice and Altintepe developments into production by 2012 and 2013, respectively. The projects have a total of 868,000 oz of JORC-compliant resources.

Untapped potential

Beyond these developments, the room for further expansion is still substantial. Turkey sits in the middle of the Tethyan Metallogenic Belt, a geological feature rich in gold and other base metals that runs from Eastern Europe to Afghanistan. "Turkey has mines and prospects in a number of geological segments; there are gold deposits from East to West. For us, Turkey is attractive because it has potential for large copper/gold deposits. At Çöpler we have reserves of 6 million oz and this will increase substantially with our next resource update. That is a world-class deposit. And it is not the only one. There are already six mines producing more than 100,000 oz/y, a couple of them are in the range of 200,000 oz/y. Right now, China is the world's largest gold producer, but big companies shun China because there are not world-class deposits there, but thousands of small mines. That is not the case for Turkey," said McKee.

According to a study published in 1977 by a well-known Turkish geologist, Ayhan Erler, Turkey has ready-to-use gold reserves of 700 mt, while exploration activities could bring to surface a further 6,500 mt. These figures are still regarded as the point of reference throughout the industry.

The number of mining companies actively exploring for gold has risen sharply, from nine to 26 within a year. Nonetheless, operators still point to the lack of an adequate investment flow.

The resumption of the license auctioning, which will initially focus on Group IV licenses (mainly concerning gold and base metals), will certainly attract more invest-



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ments. Mining companies interested in Turkey's gold are following the process closely. "This marks a key opportunity to substantially increase the company's mineral exploration footprint in Western Turkey, an area which we believe holds significant exploration upside and potential for multi-million ounce discoveries," said Soner Koldas, director of Galata Madencilik, Ariana Resources' fully owned subsidiary.

"Exploration companies should not be stopping now. They should keep going and generate new ideas and projects. We ourselves are planning to expand our presence in Turkey, including by taking part in the license auctions," said Cem Yüceer, exploration manager for Chesser Resources.

Local Turkish exploration companies can leverage their knowledge both of Turkey's geological setting and of MTA past exploration results. "I worked in the MTA for 30 years. According to my previous experience, PreGold is focusing on some properties sitting mostly on mesothermal and epithermal systems," said Mehmet Kılıç, exploration and research director at PreGold.

Since exploration campaigns are costly, those who can rely on steady cash flows can make the most out of the upcoming auctions. "While Eldorado wants to develop the existing opportunities as much as possible, our exploration teams are constantly working to find new deposits. We have some good-looking prospects and we believe our growth will come through exploration," said Tüprağ's Yılmaz.

Alacer Gold is drilling at Karakartal and Cevizlidere. "We are very committed to growing the Turkish business. Now that we have a production and a cash flow coming from Çöpler, we can invest more in exploration activities," said McKee.

Koza's geologists are working on the forthcoming auctions too. It is no secret that this heightened level of interest by different mining companies in the first auctioning process for many years will inflate prices and companies are already expecting to pay much higher prices than those typical some years ago.

"Under-the-pillow" reserves

Despite its recent achievements, Turkish gold mining has not been able to keep the pace of the booming internal demand for gold. According to the recent figures by the World Gold Council, the Turks' 2011 annual demand for gold has topped 140 mt, posting a 27% growth compared to 2010 figures inspired almost entirely by a doubling of the demand for gold for investment purposes (coins and bullions). Turkey is now the world's fourth gold market after India, China and the U.S.

The growing appetite for refined gold is reflected by the increasing activity of Turkish gold refineries. Just recently, two of them — Atasay and the Istanbul Gold Refinery (IGR) — have gained accreditation on the London Bullion Market Association, the most respected standard setter in the global gold market. IGR recently launched new products to encourage people to trade their gold holdings.

"Turkish consumers have historically used gold as an investment, and tend to buy gold in large quantities. Formerly, there were no products which allowed customers/private gold investors to purchase gold directly from banks. We have introduced GoldGram™ in weights ranging from 1 g to 100 g, which makes it easy for our customers to invest. The packaging on our products includes security hallmarks that allow the bank to identify the karat and to identify the gold as a deposit. People have been buying gold and saving it until the gold price increased. Istanbul Gold Refinery's gold is standard 24 karat and our customers can exchange their old jewelry for our GoldGram™," said Özcan Halaç, chairman of IGR, whose processing capacity is 1.5 mt per day of gold and 7 mt per week of silver.

The Base Metal Deficit

Turkey's production of base metals is still unable to meet the needs of the booming national economy.

Despite expanding, Turkey's base metal miners are largely unable to cope with the growing demand coming from the manufacturing sector. At the same time, most of the companies involved in base metal mining produce concentrates, if not run-of-mine products, to be exported and, once processed, to be re-imported as final metal or alloys products.

Copper is emblematic. According to the MTA, copper domestic production covers just 20% of the internal copper needs.

Anatolia lies in the middle of the Tethyan Metallogenic Belt, its base metal potential is large and appears mostly unexploited at the current production levels.

Turkey's inability to smelt metals from concentrates prevents the country from taking advantage of its own natural resources. And plans to build new smelters are constantly put aside because of high electricity prices that make them economically unfeasible.

This creates a trade disequilibrium that will increasingly contribute to widen the already burgeoning national account deficit.

According to the estimates of Red Crescent Resources, a company involved in base metals mining, the current dynamics will bring about a fourfold increase of the metal trade deficit by 2023.

If Turkey wants to reverse this trend — analysts point at the country's current account deficit as the main weakness of the na-

tional economy — it has to capitalize on the actual metal market prices by enhancing current production and developing recent discoveries. At the same time, it has to push through plans to build up an internal refining capacity able to absorb base metals' mining production.

Copper

Copper production covers just 20% of the internal copper needs. This deficit, caused by a low overall mining production, is accompanied by a very limited processing capacity. There is just one copper smelter in the country. Most of the companies involved in base metal mining produce concentrates to be exported and, once processed, to be re-imported as final metal products.

Copper mining is mostly in the hands of Anatolian Tigers such as the Cengiz Group and the Ciner Group. The Cengiz Group took over former Eti Bank copper interests via the privatization process. Under the brand of Eti Copper it now mines some 3.6 million mt/y of pit-run copper in its Kastamonu Kure and Artvin Murgul mines. The final output of the mining operations — some 165,000 mt/y of copper concentrate — is trucked to the Samsun smelter, the only copper smelter in Turkey, which the Cengiz Group acquired again via privatization in 2004. The plant has the capacity to produce

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Following a similar path, the Ciner Group purchased the operating license of the copper site in Siirt/Madenköy from Eti Holding in January 2004. Park Elektrik exported 80,000 dry metric tons (dt) of copper concentrate in 2011 and aims to achieve an export volume of \$120 million. In addition, there are ongoing investments to increase its processing capacity by 50% to 1.5 million dt/y of copper ore.

Within this context, Canadian Inmet appears as a rare exception of an international company developing copper mines in Turkey. The company has been operating Çayeli Bakır, Turkey's largest underground base metal mine, for almost 20 years. Production started in 1994 and the mine is projected to continue running until 2018. So far, the company has invested \$327 million to extract more than 14 million mt of ore. The actual production capacity at Çayeli Bakır is 1.2 million mt/y of ore, and 2011 copper concentrate production is expected to be 28,400 mt, plus 48,000 mt of zinc concentrate at a cost of \$81/mt per ore milled. Most of the production is exported, whereas spot trades with the only local smelter are carried out on occasion.

The potential for further developments is still significant. According to the MTA, Turkey's total copper reserves amount to 1.46 million mt of metal concentrate. Should low-grade resources be considered, the total reserves would increase to 3.50 million mt, with the majority located in the Black Sea region close to the Georgian border.

Inmet's Çayeli Bakır mine also produces some 48,000 mt/y of zinc. Zinc mining is among the mining interests of Dememan as well, which is targeting 2014 production of 60,000 mt/y from 16 mines in the provinces of Kayseri, Niğde and Ordu.

Interesting developments in zinc and other base metals mining are going on in south-eastern Turkey, a part of the country which has been historically shunned by locals and international companies alike because of the on-going violence in the predominantly Kurdish region. A number of courageous companies are now uncovering some of the potential of that almost-virgin land. TSX-listed Red Crescent Resources is among them. After taking over the 'Tufanbeyli' asset that used to be owned by Canadian Silvermet, they brought the area into production in just 13 months. "I believe that over the next 10 years, it is going to prove to be several hundred million mt of high-grade zinc oxide and sulphite mineral-

ized material," said Alan Clegg, founder and CEO of Red Crescent Resources.

"Today we have clearly defined potential for more than 50 million mt. It is a 30% open-pit and 70% underground mine and we are currently doing both; we also have an old underground mine that has been rehabilitated. The target for 2012 is to sell 30,000 mt of zinc contained in ore and concentrate. Our first shipment was 26.75% zinc, 4.5% lead and 4 oz/mt silver. The lower grade ore is to be processed via gravity concentration to reach about >25% zinc. The gravity machines cost an approximate \$1.3 million each when deployed and generate about 10 mt per hour of concentrate. The processing cost varies but is around \$35-\$45 total cost embedded per mt. We also have silver and potential for other by-product materials such as barium sulphate and, potentially, tungsten," Clegg said.

Clegg, who served as a special adviser for the former Minister of Natural Resources, Hilmi Güler, has also drafted a plan to address Turkey's lack of metal production facilities. "The one solution is to fast-track the development of Turkey's abundant mineral resources to full-blown mining operations, and push them into large-scale metal production facilities. We have put forward plans for such a hub, for which the current minister and government have indicated support. There is a state strategy to create a free economic zone within which the hub would be built, alongside synthetic fuel production and other infrastructure which Turkey needs. The first metal could be produced by around 2016," Clegg said.

To those who say that electricity costs would make the plan infeasible, Clegg said "it makes sense for the government to invest in providing the facility with subsidized electricity because the overall benefits to the economy will be self-sustaining".

The overall investment would be in the order of \$6 billion but, according to Clegg's estimates, if the government does not act, the metal trade deficit will grow to more than \$20 billion from the \$5 billion it sits at today. "The current account deficit is certainly the Achilles heel of Turkey's economy."

Free from these challenges, the Turkish steel industry has been able to catch up with the development of the local economy by doubling its crude steel capacity to 29.1 million mt over the last 10 years. This rapid development has also created room for processing metals from electric arc furnace dust (EAFD), solid waste generated during the steelmaking process in an electric arc furnace. Canadian Silvermet, for example, is



Workers at Inmet Çayeli Bakır's mine in Rize, Turkey.

recovering some 7,300 mt of zinc concentrate through EAFD. The company entered the Turkish market attempting to develop a zinc mine, but had to abandon this plan due to the effects of the global financial crisis. The set-back may well have been a blessing, as Silvermet then decided to sell the property to Red Crescent Resources to focus on EAFD recovery instead. "The raw material aspect is more dependable than mining because there is a continuous supply. Turkey is the 10th largest steel manufacturer in the world, the resource keeps growing as the Turkish steel industry continues to expand and there is no limit to the life of the resource. Existing EAFD processing capacity in Turkey is much less than the amount of EAFD being produced by steel manufacturers, so we think there is a growth opportunity for us," said Ian D. Atacan, CFO of Silvermet.

Silvermet processes EAFD to obtain zinc oxide, an intermediate zinc concentrate (70% zinc content), to be exported to smelters that then refine the product up to 99.995% zinc. Its current output of EAFD is 62,000 mt/y results in production of 16,000 mt/y zinc oxide. Since there are no zinc smelters in Turkey, Silvermet export its entire production, mostly to Belgium and Korea.

Nickel

Although it does not share the nickel reserves of countries such as Russia and Canada, Turkey is at the forefront in regards to the extraction of nickel from oxide type ores — laterites.

Up until recent years, the global supply of nickel has relied predominantly on sulphide type bodies processed through pyrometallurgical routes. The steep drop in sulphide type ore reserves is pushing the industry to develop efficient ways to process laterites, which today constitute 80% of the world's nickel reserves. Turkey's main laterite deposits — clustered in the region of Manisa and Sivrihisar — have transformed into a testing ground for nickel extraction based on high pressure acid leaching (HPAL) processes.

Ankara-based Meta Nikel was the first company to mine nickel in Turkey. Their Manisa-Gördes property has produced a total of 230,000 mt of lateric-type nickel ore from two open-pits since 2003. The company is now committed to investing up to \$500 million to build up the first hydrometallurgy process plant facility in the country. The first phase consists in a \$250 million investment to process 1.5 million mt/y of lateric ore and obtain nickel and cobalt



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Ali Safder İplikçioğlu, general manager, Meta Nikel Kobalt.

concentrate. The concentrate (MHP) will be equivalent to 10,000 mtpa nickel metal and 750 mt/y cobalt metal. This phase is to be completed by the end of 2013, when the plant is expected to start commercial production. Then, Meta will invest another \$250 million to expand the production capacity to 3 million mt/y of laterite ore. At that point, the MHP will be equivalent to 20,000 mt/y nickel metal and 1,500 mt/y cobalt metal, resulting in a yearly turnover of approximately \$400 million, at current nickel prices. "Meta will use HPAL technology at Gördes," said Ali Safder İplikçioğlu, general manager of Meta Nikel Kobalt. "Before deciding on the technology, Meta carried out an extensive laboratory testing program and economical analyses on the available technologies, namely, heap leaching, tank leaching and HPAL. As a result, HPAL technology was selected mainly due to its low environmental effects (it is a controlled process within a closed circuit), high metal recovery level and its low operational cost (due in part to its low sulphuric acid consumption). The selected method was

tested in pilot scale in Australia and Canada to guarantee that this is the safest technology to use for Gördes ore, especially from an environmental point of view."

The technology is currently used by a number of countries including Australia, Canada, U.S. and China, although Gördes will be the first project to use HPAL technology in Europe.

A few kilometers away from Gördes, AIM-listed ENK unsuccessfully tried to develop another promising laterite deposits at Caldag. The company had originally planned to invest almost \$300 million to produce 20,000 mt/y of nickel. Should the plan have been carried out, it would have been the first commercial nickel laterite heap leach operation in the world. However, the company's plans were delayed by the financial crisis in 2008. When it managed to find the necessary capital from Chinese partners by accepting higher financial costs that raised the overall cost of the development to \$428 million, its forestry permits were challenged by the authorities. The company tried in vain to have the permits reinstated, and the management finally decided to sell the property for \$40 million to Turkish OreMine to focus on another development in the Philippines. "After years of uncertainties, ENK realized it did not want to deal with the Caldag project any more," said Cevat Er, general manager of Sardes, the former ENK's local subsidiary that has now been sold to OreMine. "This is because ENK is a small company. If a company like ENK starts operating, it can not run the risk of having operations suspended for any regulatory issue because this would bankrupt the company. They felt that operating in Turkey would not have been easy and they did not want to take the risk."



Birol Kaya, director general, Fe-Ni Mining.

Aside from multiple projects to construct process plant facilities, there are already several local companies producing nickel ore to be exported. Some are focusing on the quality of their processes to improve the success-rate of their ventures.

"We have constituted a research and development department as well as a foreign affairs department in order to apply modern exploration and production techniques and marketing processes," said Birol Kaya, director general of Fe-Ni Mining. "Within this framework, project-based studies have been implemented by the geological and mining engineering departments of Hacettepe University-Ankara, Ankara University and Dokuz Eylül University-İzmir."

Fe-Ni Mining has properties in the Ka-
raçam-Eskisehir area and the company is carrying out exploration activities to find new untapped reserves. "Up to now, on the basis of geological and analytical data collected from both licensed areas, total reserves are estimated at 6 million wet metric tons (wmt)," said Kaya.

Chrome

Chrome ore mining in Turkey dates back to 1850. Since then, the country has established itself as one of the world's most established high-quality chrome ore producers (Cr_2O_3 44/48% content). Despite a consistent residual potential, according to the MTA, chrome ore reserves with more than 20% Cr_2O_3 are about 26.5 million mt, after years of exploitation head grades are inevitably decreasing; in some cases to the extent that past waste materials are now being treated as precious ore. "We started mining in 1947 and we have accumulated a lot of tailings since then. Over the years head grades in the mines have decreased, but when we checked our tailings we realized many have higher grades than our current head grades. Meanwhile, prices have gone up and technology has improved. If



A panoramic view of Meta Nikel Kobalt's mine site.

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in the past it was not feasible to produce chrome with a grade of less than 45%, now we can earn a good profit with 6.5% run-of-mine ore," said Murat Eroğlu, deputy chairman of Dedeman Mining, one of the oldest private mining companies in Turkey.

Overall, Turkey produces more than 6.5 million mt/y of chrome ore, a level second only to mining powerhouses such as South Africa, Kazakhstan and India. Part of that production is absorbed by local ferrochrome plants. Turkey has two ferrochrome and one chrome chemical plants and their annual ore need is about 530,000 mt/y, just a fourth of the country's production, the rest is sold abroad. Chinese ferrochrome smelters are by far the largest recipients of Turkish chrome ore, followed by Russia and India. In 2010 alone, export values for chrome topped \$471 million.

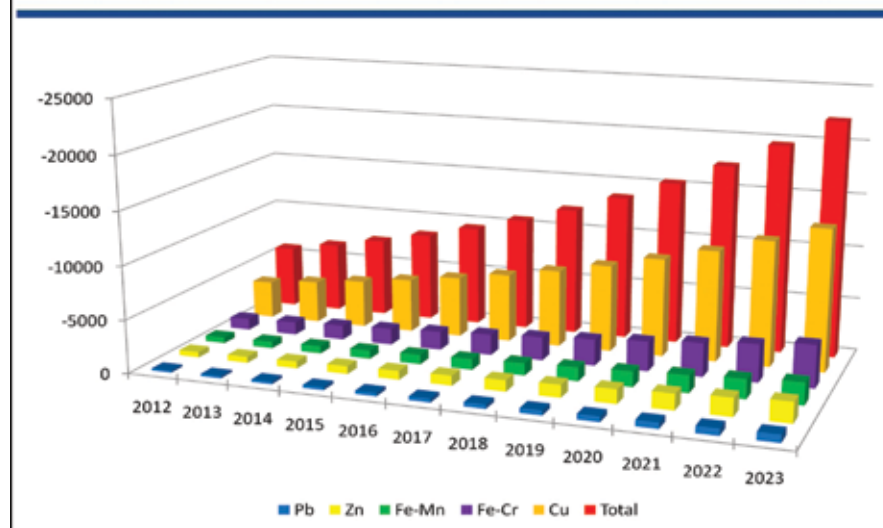
Reserves are mainly clustered in six different regions: the Guleman region (Elazığ, in eastern Turkey), which still holds the most important deposits in the country, the Kopdağ region (Erzincan-Erzurum, also in eastern Turkey), the Fethiye-Köyceğiz-Denizli region in South-West Turkey) the Bursa-Kütahya-Eskişehir region in North-West Turkey, the Mersin-Aladağ-Pınarbaşı region in the South and the İskenderun-K. Maraş region (Southern Turkey). In addition, there are several low grade chromite deposits, the most important of which is located in the Aladağ region (near Adana, in the South) where there are 200 million mt of 5.42% chromite.

Alongside iron ore, chrome ore is used to produce ferrochrome that will ultimately



Eti Bakır Murgul copper mine is owned by Cengiz İnsaat using ROC L8 drill rigs at their open-pit copper mine. They are drilling with Atlas Copco Down the hole hammer 165 mm.

Turkey Balance of Payments, Projected Deficit (US\$ M) from Metal Imports



end up in stainless steel furnaces. Accordingly, its price reflects the development of the steel industry. Despite the steady recovery posted in 2010, the outlook for the steel market still hangs in the balance. With the outcome of the European and American sovereign debt crisis still uncertain, Chinese ferrochrome producers, the world's largest buyers of chrome ore, are hesitant. Their uncertainty inevitably affects the whole sector's value chain, with chrome ore prices currently suffering from a downward trend. Prices for Turkish chrome concentrate (Cr_2O_3 44/48%) and lumpy chrome ore (Cr_2O_3 40/42%) are around \$300/mt and \$280/mt respectively. These prices are a far cry from recent peaks, but remain at very high levels compared to historical averages and are still able to offer interesting profit margins.

As a consequence of historically high prices, Turkish chrome ore miners are expressing interest in low-grade deposits and are investing to expand their mining and processing capacity. Dedeman Mining, one of the top three Turkish chromite producers, is about to carry out a two-step investment in the Adana province, where the company has measured and indicated resources of more than 20 million mt.

The project consists of two gravity separation facilities able to produce 150,000 mt/y of chromite concentrate. "Taking our other chrome ore mines into account, we expect to increase our chrome concentrate and lumpy production to more than 400,000 mt/y chrome by mid-2014. We are planning to invest \$60 million in each plant," said Dedeman's Eroğlu.

As the scale of mining operations expands and head grades shrink, technology and processes must be updated. "Chromite is picking up considerably because mining grades as low as Cr_2O_3 5% have become economically feasible. Recovery rates are still increasing, while operation costs go down. We are now processing Cr_2O_3 5% chromium, but there is some room left for further developments: we can go down to carbon values as low as 3% or 4%," said Dama Engineering's Karahan.

Dama has been among the first to put in place gravity separators able to recover fine chromium from extremely low-grade ores.

The opportunities offered by the chrome ore market have also attracted a plethora of smaller local producers and traders that mine chrome ore outcrops to sell them to Chinese ferrochrome producers. They started proliferating from 2005 onwards and those who survived the global financial crisis are recovering quickly from the slump in demand. Companies such as AKM Madencilik are growing quickly on the back of Chinese furnaces.

"We have two mines where we produce approximately 18,000 mt of lumpy chrome ore per month. At the beginning of 2011, AKM started producing iron ore from two other mines and the output there is around 53,000 mt per month, plus another 30,000 mt that will be added by December 2011. Overall, our actual turnover is \$12.5 million and we are planning to be publicly listed on the Istanbul Stock Exchange in a foreseeable future," said Kadir Gültekin, CEO of AKM Madencilik, a start-up producer launched in 2010.



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Coal for Energy Independence

Turkey's government is increasingly engaging with the private sector to get the most out of national coal reserves, with the aim of addressing its dependency on imported energy.

Over two thirds (72%) of Turkey's 2010 total primary energy supply came from overseas. Hard coal imports serving the needs of thermal power plants, steel production, and industrial and domestic heating purposes amounted to 26.9 million mt/y, while only 38% of Turkey's coal reserves were used for energy generation. This resulted in a \$50 billion annual energy bill, a sum that alone makes up for two thirds of the current account deficit. What's more, the government expects the country's energy needs to double over the next decade.

Within this scenario, Turkey's Energy Market Regulatory Agency (EPDK) drew up a 20-year investment plan to increase Turkey's energy independence. "Within fossil fuel-based power generation, 25,000 MW in additional capacity is needed for the next 20 years. If we choose to build new fossil fuel plants, Turkey will spend nearly \$225 billion on them over the next 20 years," said EPDK president Hasan Köktaş in an interview with *Today's Zaman* last October.

As Turkey's indigenous energy resources consist almost exclusively of lignite and a small amount of hard coal, coal mining will be a natural recipient of these investments.

According to Eurocoal, the European Association for Coal and Lignite, the country has around 1.3 billion mt of hard coal and 11.5 billion mt of lignite resources, of which 500 million mt and 9.8 billion mt respectively are proven reserves. The MTA started new exploration campaigns in 2005 to identify untapped coal deposits. So far, it has drilled 65,000 m, succeeding in adding 4 billion mt to the country's total lignite reserves. The project is still ongoing.

Lignite deposits are widespread throughout Turkey, with the Afsin-Elbistan lignite basin of south-eastern Anatolia, near the city of Maraş, and the Soma basin in western Anatolia being the most important geological formations. The quality of Turkish lignite is generally poor and only around 6% of the reserves have a heat content of more than 3,000 kcal/kg. Turkey's main hard coal deposits are located in the Zonguldak basin, between Ereğli and Amasra on the Black Sea coast in north-western Turkey.

Coal production has increased by approximately 10 million mt in the last 10 years and reached 71.8 million mt/y in 2010. Almost all of the coal produced is lignite while hard coal's share makes up

only 3.9% of the total. Despite long-standing efforts to open up the sector to private capital, three state-owned enterprises were directly responsible for more than 90% of total 2010 coal production: Turkish Coal Enterprises (TKİ), Electricity Generation Company (EÜAŞ) and Turkish Hard Coal Enterprises (TTK).

However, as 35% of the three state companies' output comes through private sub-contractors, a number of private companies also have a long-standing experience in coal mining. These ventures are now trying to leverage their know-how by grabbing the new opportunities Ankara is giving to the private sector to boost both hard coal and lignite production.

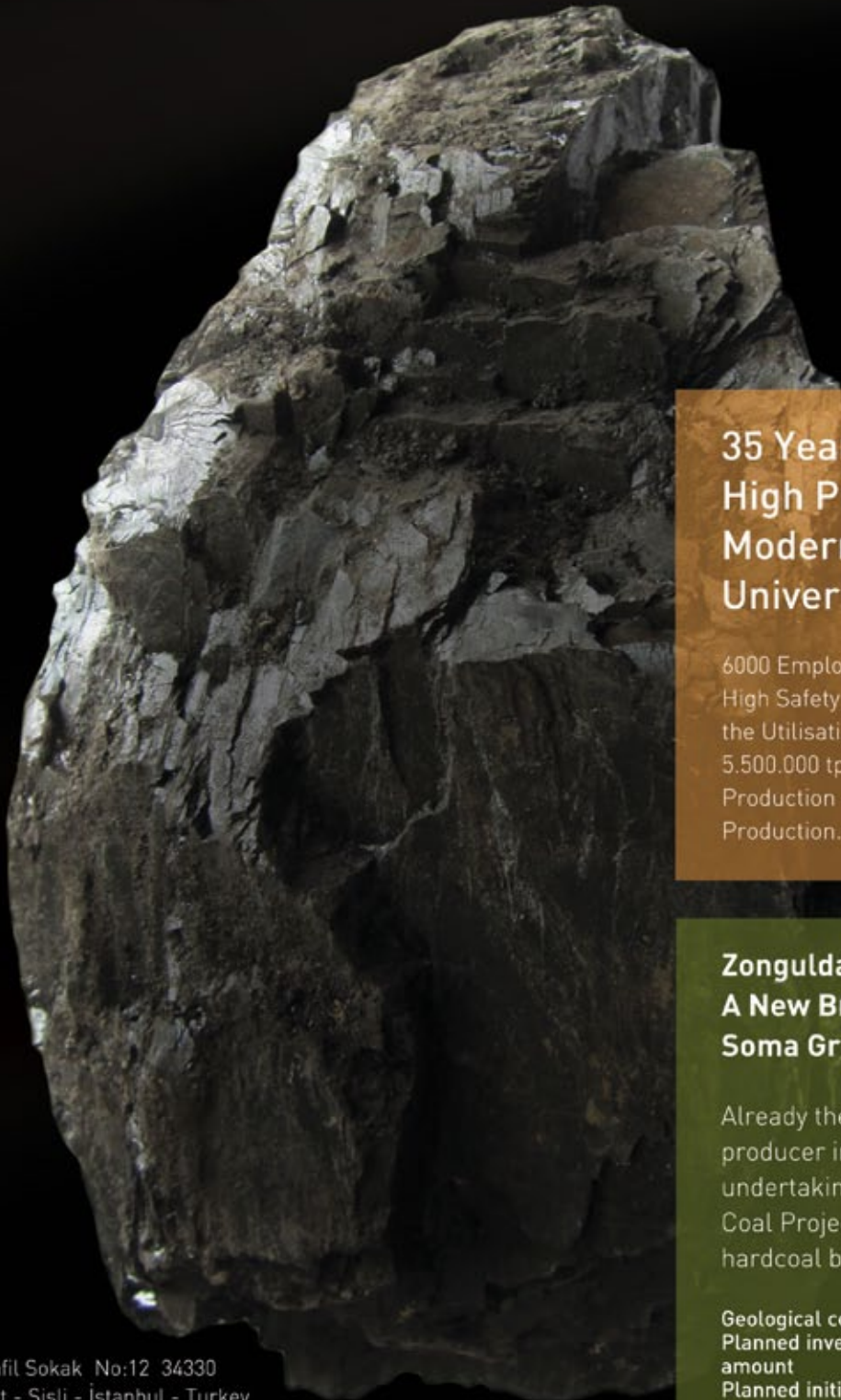
The Koç group's Demir Export has won the tender to develop a large coal basin in the Soma region. It concerns a potential production of 2.5 million mt/y of coal over a projected 18-year lifetime. The company has gained over 20 years of experience at the Sivas Kangal coal mine whose 6 million mt/y production served to meet the needs of the state-run, 457 MW Kangal thermal power plant. Concessions for a \$1 billion project have also recently been granted to



Soma Group's Eynez coal mine.



Polat Kömür's CEO Muzaffer at the signing ceremony with Zhejiang Minerals, their Chinese partner.



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MINING IN TURKEY



Alp Gürkan, chairman of the executive board, Soma Group

Polat Kömür. It involves the development of 2,000 hectares area in the Soma basin and the construction of a 650 MW power plant. The company, which has been active in coal mining for more than 27 years, has uncovered reserves for 100 million mt in the licensed area and, as drilling progresses, hopes to raise that figure to 200 million mt.

To carry out the project, Polat plans to join efforts with Zhejiang Energy, a Chinese state-owned power enterprise originally based in Zhejiang Province's Hangzhou City. "We thought it would have been an ideal solution to cooperate with a mining and energy company coming

from China, a country that relies on the best underground mining technologies in the world. As our partner, Zhejiang Energy will provide the project with the financing, the technology and the general management regime. We plan to finalize the partnership in the next six months, to mine coal in three years and to start producing energy within five years," said Muzaffer Polat, chairman of Polat Kömür. Polat is targeting 3 million mt/y production. According to Polat, the quality of the lignite after enrichment will be of 5,000 kcal/kg.

Concessions have been granted to private enterprises also in the field of hard coal mining. Although rare, hard coal is not absent from Turkey. Most of it is located in the north-western province of Zonguldak, where coal mining dates back to 1850 and where the country's first mining school was opened in 1936. The calorific value of hard coal reserves varies between 6,200 and 7,200 kcal/kg. TTK operates five deep mines there and so far has accounted for Turkey's entire current hard coal production (2.8 million t/y).

Private companies will soon add their contribution. "The Zonguldak area contains more than 1 billion mt of thermal and coking coal resources, but it's been historically difficult to extract. The area

has been mined since 1850, but the difficult conditions have prevented extraction on a massive scale. TTK realised it could not work economically in its current scale and passed on some of its concessions to the private sector through tenders," said Alp Gürkan, chairman of the executive board of the Soma Group, a company that has been running an underground mine in the Soma area since the 1980s.

The Soma Group has just been awarded the right to develop an underground mine which holds 90 million mt of coking coal in Zonguldak. The total investment will be on the order of \$200 million and the pit is expected to be operational in six years. Once fully developed, the mine will produce 2 million mt/y. The development will happen at a depth ranging from 400 m to 1,000 m. Soma is now looking at continental Europe to import the expertise needed to handle the entire process. "Coal mining has gone deeper everywhere. Equipment and expertise have already been developed in countries such as Germany, Poland and the U.K., and Turkey will be the next market for its use," said Yücel Piçakci, Turkey's project manager for DMT, a German engineering and consulting company.

Private capital has the potential to dramatically upgrade Turkish coal production. The Ciner Group has pioneered the presence of private companies in coal mining and related energy production. Following a privatization process in 1999, Park Termik, a subsidiary of the Ciner Group, took over a fully integrated coal-to-electricity project in Çayırhan, where it operates a 310 MW thermal power plant supplied with coal coming from a contiguous underground mine. The company has succeeded in steeply increasing the output of the mine as well as the efficiency of the plant. According to the company, the Çayırhan thermal power plant has increased its capacity use ratio from 48% to 81% and the daily production capacity of the coal mine has jumped from 500 mt to 7,000 mt.

Recently, Tamer Yıldız, the Minister for Energy and Natural Resources, reiterated the government's commitment to increase the role of domestic coal in the national energy mix by giving away concessions to the private sector. Last November, Yıldız announced a new round of privatizations concerning 2.8 billion mt of lignite reserves in three regions in 2012, which will support 7,000 MW of new installed capacity. Private capital is set to have a larger role in the quest to limit Turkey's dependency on energy imports.

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Industrial Minerals: The Boron Country

Turkey has a large variety of industrial minerals that can either feed local manufacturers or be exported.

Boron, a substance used mostly in the glass and detergent industry, is Turkey's most significant industrial mineral. About 72% of the world's Boron reserves are located in Turkey. Such a wealth guarantees an increasing flow of exports that, to some extent, help counterbalance Turkey's trade deficit. This adds strategic value to boron reserves and helps explain why Ankara has not allowed boron production to undergo a privatization process alongside those of other minerals. Feldspar, quartz and other minerals are also widespread throughout the country, but are widely exploited by public as well as private sector companies.

For the time being, Eti Maden, the still-state controlled Eti Bank company, controls the entire boron value chain, including production, processing and marketing. The state-owned company went through a deep restructuring after the liberalization of the 1990s and has focused solely on boron since 2004. The new arrangement has paid off — fostering an increase in boron's exports to \$900 million in 2011, compared to just \$200 million in 2000. "We have increased our production capacity five-fold: we are actually refining two million mt/y of borates, whereas in 2002 we didn't go beyond 400,000 mt/y," said Orhan Yilmaz, chairman and general manager of Eti Maden.

Boron production is carried out at four mines and four associated processing plants which produce three different borate minerals: colemanite, ulexite and tincal. Despite its recent growth, Eti Maden's ambitions are far from being fulfilled. The company is working on a \$600 million investment plan that should raise its production of refined products to 5.5 million mt/y by 2023. Alongside the efforts of Eti Maden to increase its production capacity, the government also established the National Boron Research Institute to widen the range of application for boron's chemical derivatives. "We want to increase boron's consumption in different areas," said Sufyan Emiroğlu, chairman of the board at the National Boron Research Institute. The range of boron's potential applications is wide and ranges from batteries for electric vehicles to superconductors. One of the new applications

researchers are working on concerns the involvement of boron in next-generation green cars. Recently, the National Boron Research Institute tested the first car to run on a sodium borohydride fuel cell. The fuel cell consumes nearly 1 kilogram of borohydride per 35 km and the vehicle can cover 100 km at a maximum speed of 80 km/h.

Within the wide spectrum of industrial minerals, Turkey's production of soda ash also stands out. Eti Maden has joined efforts with the Ciner Group to mine trona — natural soda ash — at Beypazarı, 100 km North-West of Ankara. Beypazarı's trona bed contains the largest reserve in the world, along with the reserves in Kazan (Ankara) and following the reserves located in Wyoming. Following a \$375 million investment, Eti Soda (a joint venture with 75% from the Ciner Group and 25% from Eti Maden) started operations at Beypazarı in 2009. The company produces 1 million

mt/y of soda ash and 200,000 mt/y of sodium bicarbonate through solution mining and is undertaking research to increase the overall capacity of the site by 50%. In addition, the Ciner Group has also taken over another trona deposit in the Ankara vicinity which Rio Tinto had been unsuccessfully trying to develop for several years. "The annual capacity in that project will be 2.5 million mt/y. It will be another solution mine. We are undergoing the feasibility study and the design of the processing plant. We are also considering attaching a 400 MW gas-fired power plant to the mine," said Sami Demirbilek, president of the Energy division of the Ciner Group.

Eti Soda has to compete with another Turkish producer, Soda Sanayi, which produces 1.8 million mt of soda products through a typical ammonia-soda process — the Solvay process — and whose sole inputs are limestone and salt brine.



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An Increasingly Solid Supplier Base

Growing mining exploration activities and operations have created the need for an equally vibrant service and equipment supplier base.

As little as 10 years ago it was difficult to find drilling contractors and equipment suppliers in Turkey. Today, the situation has changed dramatically as both local suppliers and traders have been gradually closing the gap. The supply of rigs and drilling services has quickly increased, and engineering companies, consultants and software houses are supporting a general upgrade of mining operations throughout the country.

Drilling is going deeper

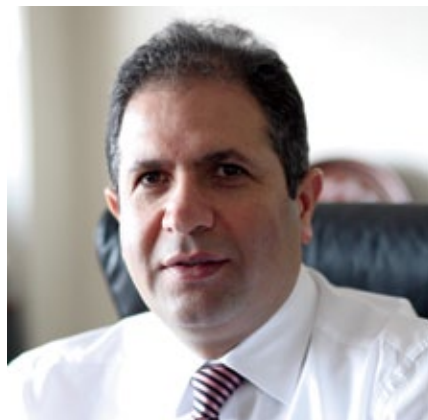
To uncover Turkey's mineral potential, exploration activities have to drill deeper underground. "In Turkey, most of the mine exploration facilities have been sustained in shallow environments (near 200-300 m).

For this reason, Turkey is an undiscovered country and there is potential for the discovery of a wide range of economic mineral deposits.

Apart from some underground coal mines, there are just two main large-scale underground operations in Turkey; Inmet's Çayeli Bakır and Eldorado's Kışladağ. As surface deposits are gradually being depleted, mining companies are well aware of the need for deeper and more comprehensive drilling campaigns.

As drilling goes deeper, new challenges emerge. "From a drilling perspective, Turkey's geology is very complex because of the main fault areas in the eastern and northern parts of the country. Drillers often have to case the holes to protect them," said Ahmet Zeki Topdemir, general manager of Ortadoğu Sondaj, one of the largest drilling contractors in Turkey with 30 rigs.

This all leads to an increasing need for deploying better technologies on the ground. "We delivered more than 50 Boart Longyear core drill rigs to our customers in the last decade. Eleven of these have



Bülent Şahhüseyinoğlu, general manager, Mapek.

been delivered in 2011. In Turkey, there are around 300 actively working drill rigs in total and around 180-200 of these are old, locally manufactured and of a low capacity. Boart Longyear drilling equipment has been used with almost all other rigs for many years," said Bülent Şahhüseyinoğlu, general manager of Mapek, Boart Longyear exclusive distributor for Turkey.

Mapek has also sold two Boart Longyear LS-230s, the most powerful drilling rig currently available on the Turkish market, with a capacity of going as deep as 2,300 m.

To better serve a more sophisticated and booming demand for drilling services, the largest local contractors have put to work the expertise gathered over the last decade to establish in-house manufacturing of drilling rigs. According to Levent Okay, president and CEO of Spektra Jeotek, an established contractor active in Turkish mining, civil engineering and water well sector since 1985, in-house production "is an immense advantage and a major cost controller and quality booster. It allows unlimited and immediate access to the required hardware."

Spektra's Delta Makina manufactures three models of core-drilling rigs and two reverse circulation drilling rigs at a maximum pace of 14 rigs per month. In 2011, it produced 35 rigs for the market and 27 for the needs of Spektra itself. Ortadoğu Sondaj has also established its own production facility in 2010, Geo Makine, whose production capacity is currently at three rigs a month.



LIFE for Drilling

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Other contractors are focusing on adapting imported technologies to the Turkish setting. "We are thinking of rigs that can do the job almost by themselves – lowering and pulling the string by themselves for instance. We are trying to modify the rigs in our workshop to make them more automated. If the potential limits of the rigs itself are not enough, then we are developing better supporting tools and vehicles. After almost 20 years at this job, we are still learning new things each day to improve ourselves. We have brilliant innovations to bring drilling life," said Murat As, general director of IDC, a drilling contractor with a total of eight rigs that can perform both diamond and reverse circulation drilling.

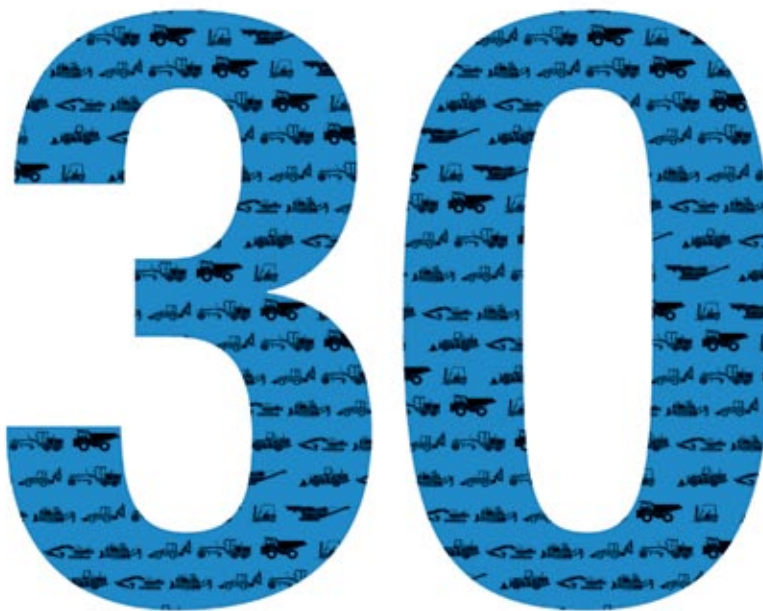
Deeper drilling operations also require accurate data management in order to best assess the results of the on-going operations. From this perspective, the Turkish mining industry is still going through a learning process. "Turkish companies lack the skills required to accurately evaluate their data and general data management. The same areas are drilled several times because the data is lost or misinterpreted, leading to significant losses in money and time. Some companies have lost their samples or make mistakes while analyzing data, which is something that needs to be improved. Installing newer software for data evaluation and management can support company's efforts to drill deeper," said Esin Şişman, Turkey's country manager for Maxwell Geoservices, an Australian producer of software for the mining industry.

When it comes to deeper operations, more investment in health and safety is needed and distributors such as PenaMaden are catching up with this growing demand for HSE solutions. Alongside ventilation and measurement systems, PenaMaden has just closed a deal to distribute the first refugee chambers available in Turkey. "Mining is going deeper and HSE safety standards are increasing day-by-day. HSE solutions will experience a growing market in Turkey," said Togan Yürür, general manager of PenaMaden.

While drilling campaigns continue to evolve, the post-global financial crisis commodity price bonanza, now partially reversed, has increased the pace and the scale of surface mining operations. Operations that, a few years ago, would have proved to be economically infeasible are now largely profitable. "Back in 2001, gold was selling at \$300/oz and mining operations at Ovacık focused only on high grade ores of at least 10 g/mt. Now, the

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
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ounce of gold is selling for \$1,700 and we are using ores with grades of only 3 g/mt," said Ismet Sivrioğlu, general manager of Koza Gold.

Mining lower-grade ores means increasing the scale of mining operations as well, with more tonnage to be mined, transported, and processed. This all requires a resizing of processes and equipments. However, it is not just a matter of size: the quality of mining operations must be improved as well, as the opportunity cost of putting them on hold for technical faults is particularly high these days.

Local suppliers and importers of equipment are increasingly aware of these dynamics. "We are working against time. Companies need to mine as much ore as they can now that prices are that high because, in the event of a cooling of the commodity cycle, their operations may suddenly become infeasible," said Vedat Kirişçi, managing director of Metrans, a distributor of industrial pumps and valves to the mining industry and other industrial sectors.

Accordingly, companies are putting more effort into tackling the current needs of mining companies operating in Turkey. "Lower-grade ore companies need bigger and more sophisticated equipment," said Erdem Tüzüenalp, general manager for Atlas Copco's mining business in Turkey.

"They are looking to put in place less problematic operations because right now the pricing on the market is good. In the past, mining companies were operating with used, small and cheap equipment, while now they are definitely focusing on bigger and better products," said Can Özdemir, general manager of Dize Turbo, a local distributor of Astec Industries' processing equipments.



Workers operating the drilling rig. Photo courtesy of Spektra.

Closing the Investment Gap

Despite its potential, the stream of funds channelled towards the Turkish mining industry remains weak.

The unavailability of capital is due to several factors. The Turkish private mining sector has been developing only recently — the first mining code was approved in 1986, with following reforms in 2004 and 2010 — and the industry is still in its youth with a very low level of financialization. Mining companies struggle to access credit lines because they are unable to transfer the value of their reserves to their balance sheets. Unused to the mining industry, Turkish Banks cannot get a clear picture of the risk involved in any operation and end up avoiding them altogether. “The concept of international reporting systems such as the 43-101 is only starting to be understood by local Turkish companies. Companies are now looking for investment from banks and financial institutions. As a result they are increasingly confronted with specific terminology on reports and bankable feasibility studies and there is an accompanying greater need to service the development of projects for them to obtain the necessary financing. Also, the concept of qualified (QP) and certified (CP) personnel is not yet available in Turkey and, since there are only four or five CP or QPs in the whole country who have the authority to sign international or bankable geological reports, it is necessary to go overseas to get these services,” said SRK’s Arpacioğlu.

Among the top Turkish banks, the most active in the mining sector is YapıKredi, with an overall exposure to the mining sector of TRL 2.26 billion (7.47% of the total cash loans, 4.12% of the total non-cash loans). For most of the other big players, such as İş Bank, Garanti Bank and AK Bank, the mining sector attracts less than 1% of their loans and important recent projects such as the Çöpler gold mine developed by Alacer Gold obtained their financing from foreign banks (in Alacer’s case, Unicredit via Bayerische Hypo- und Vereinsbank).

The most common way for smaller mining ventures to get financed is to go through a public listing on the stock market. Companies such as Chesser, Ariana and Red Crescent Resources have raised capital on foreign stock exchanges — Sydney, London and Toronto, respectively — to come and carry out exploration activities in Turkey. In this

perspective, the Istanbul Stock Exchange (ISX) still has a long way to go. To get an IPO approved on the ISX companies have to show steady cash flows, something that prevents any exploration company from approaching the market. To some extent, this is preventing the sector from increasing its standards. “A weakness of the Turkish mining sector is that there are very few companies listed in the national stock exchange. Most of the mining companies in Canada and Australia are listed and this forces them to be as transparent as possible. This has not yet happened in Turkey,” said Savaş Şahin, assistant general manager at Demir Export.

A reform to make it easier for small caps to enter the ISX is on its way and life for local explorers looking for capital may become easier in the coming years if this proves to be the case.

With the traditional sources of investment for mining running dry in Turkey,

equipment suppliers are adapting their commercial offer to the needs of cash-strapped players. “The biggest problem for my customers is to build up the financial capability to carry our investments in our equipments. Historically, the lack of financial capital has always characterized the Turkish economy. Mining companies struggle to put long-term investments in the pipeline because they have limited access to credit lines and other sources of credit. This is why our biggest job is to find financing solutions for them and within this context we started to introduce equipment rental solutions in Turkey. But this is still not enough to cover the demand and we are studying further solutions. If only the sector had the financial resources it needs, the equipment fleet would double straight away,” said Cihan Ünlü, marketing and sales manager of Temsa Global, one of the world’s largest independent distributors for Komatsu equipment.

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MINING IN TURKEY

Others, like Atlas Copco, are directly providing their clients with the credit they need to build or upgrade their equipment. "We can supply our clients with the credit for their operations through our internal bank. Most of our smaller clients do not have the opportunity to access banking credit. Therefore they are being financed by us instead," said Atlas Copco's Tüzünel.

Another alternative source of capital comes from the Anatolian Tigers active in the sector. Most of them have been actively involved in the construction sector for decades and have piled up large amounts of cash on the back of booming domestic and international developments. "They have cash, but lack the know-how needed to carry out mining operations. A lot of them are ready to invest alongside foreign companies that can provide them with the know-how which they lack," said Baran Umut Baycan, founding partner at the Baycan Law Firm, specializing in mining legislation.

These major international players can also turn to the local market to get the expertise they need, fostering in this way the development of local engineering companies such as Dama Engineering and the Engineering and Mining Consultancy (EMC).

The presence of some vast and sophisticated conglomerates will likely help take

the sector to the next level. "Large Turkish groups are making big investments in the Turkish mining industry. This is creating the environment where there will be a proper finance solution for the sector and financial corporations are looking at it closely," said Hakan Kayganacı, managing director of Risk Management Practice at Marsh Turkey. The insurance industry is no exception to this. Marsh itself has just established a dedicated team in Turkey to serve the mining industry with risk management solutions. For the time being, apart from quarrying, insurance solutions for the mining industry in Turkey are still not available on the market, due to the international perception of high Turkish risk. However, as the mining sector and its legal framework develops, companies such as Marsh are confident that risk management practices will become more sophisticated and commonplace. "Should more structured project financing processes be in place, we would have a better case for a demand of insurance solutions," said Kayganacı.

In regards to the market risk, financial institutions such as DenizBank and İşBank can carry out hedging strategies on the London Metals Exchange (LME) on behalf of their clients. For small, dynamics mining companies whose fortunes are not rooted in a construction or financial empire but who can rely on

internal trading expertise, they must constantly depend on a hedging strategy. "Back in 2008, we saw the global financial crisis coming and we completely shut down operations for more than a year. Now we have reopened the mine but continue hedging our position day-by-day," said Benjamin Pinto, general manager at Turmenka, a mining company that produces around 7,000 mt/y of concentrates (zinc, lead and copper) in the Black Sea region.

Going abroad

Turkish miners are not only interested in reserves at home. Following the steps of Turkish construction companies, and the making the most of Turkey's increasing political and commercial influence, Turkish companies are expanding operations overseas, in places such as the Balkans, the Middle East, the so-called Turkish republics (Azerbaijan, Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan) and Africa. But, again, those who managed to secure licenses abroad are on the look-out for capital to follow through with their plans. "The project needs a lot of capital and we are only at the very beginning and looking for partners to develop it," said Eyup Akdağ, co-chairman of the Akdağlar Group, an Istanbul-based conglomerate that has just won a tender to develop the largest nickel deposit in Albania through its subsidiary, North Star Mining.

In their push to grow abroad, some company's can leverage off the experience they gathered in the recent development of the Turkish mining industry. "Given Spektra's experience in the Turkish market and given the complexity of geology and terrain within our national frontiers, we have been able to branch out and penetrate into the international marketplace with a good level of confidence and comfort. Our vision is to be one of the reputable international players in this line of industry within the foreseeable future and we have the energy, determination, know-how and resources to do so. We are planning to operate in more than five continents within the next five years", said Spektra Jeotek's Okay.

Spektra has grown its fleet to 90 rigs, a threefold growth compared to 2008, and it is now active in eight African countries, in the Middle East, and has just established a subsidiary in Canada "where we are planning to start operations in a few months and where we are looking for opportunities to acquire existing companies to increase our presence faster."

Turkish construction companies are also creating opportunities abroad for companies active in the mining sector. "We carried out

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the major part of the design and engineering scope of an approximately 230 km long slurry pipeline, in Morocco. Our client in this project is a leading Turkish construction company who was awarded the EPC contract by the Moroccan state-owned organization which accounts for 30% of the world's phosphate production," said Zafer Toper, CEO of Afrasia, a local consulting company.

Many others are focusing on the Balkans. Following the collapse of Yugoslavia, its mines have been underexploited, if not abandoned, for years — sometimes leading to severe environmental impacts. The ongoing stabilization of the region is now paving the way for a rebirth of the local mining industry.

With deposits for some 6 million mt of chrome and copper ore, Albania is proving to be a favourite among Turkish explorers. Ekin Maden has strengthened its presence in the country by signing an agreement with Canadian Torex to commence commercial production of copper and gold from six areas of the Mirdita District. The resulting 50:50 joint venture is gearing up to reach a processing capacity of 2,000 mt of ore per day. Tete Mining, which has been mining in Albanian Muenella copper project since the early 2000s, is developing the Spac copper project alongside plans to open a new chromite mine. Meanwhile, the Akdağlar Group has just won a tender to develop the largest nickel deposit in the country through its subsidiary, North Star Mining. "The project needs a lot of capital and we are only at the very beginning and looking for partners to develop it. The mine has a production history but they were closed during the political conversion of Albania and now we have won the tender for the property," said Eyup Akdağ, co-chairman of the Akdağlar Group.

Kosovo is the hottest play in the region. Novo Brdo's mines have been renowned for centuries. In the words of Konstantin the Philosopher, a famous Byzantine historian, this town was "in truth, a city of silver and gold." Kosovo can still boast 50% of the former Yugoslavia's nickel reserves, 48% of its zinc and lead, 47% of all magnesium, and 36% of the country's lignite. Kosovo is also rich in asbestos, bauxite, chrome, limestone, marble, and quartz. According to International Council on Mining and Metals, the "small territory (is) home to one of Europe's most concentrated and potentially most lucrative mining sectors. With upwards of 14.7 million mt of exploitable reserves, Kosovo is host to the fifth largest accumulation of lignite coal on the planet."

Turkish companies are working to get their share of the cake. Two of the country's largest conglomerates, the Ciner Group and

the Koç Group, are bidding for a couple of coal-fired power plant projects. The winner will be assigned the mining rights to 330 million mt of lignite from the Sibovc South area. Both groups have a mining subsidiary operating in coal mining at home: Ciner's Park Mining and Koç's Demir Export.

Tete Mining is also looking for new opportunities in the area. "We want to strengthen our projects, especially in Kosovo," the company said in a press release. Turkey is already Kosovo's fourth largest trading partner with \$284 million in trade volume. Its strategic importance is being underlined by Turkish efforts to have the country's independence recognized on an international stage, when 85 states have yet to do so. Beyond Albanian and Kosovar borders, the Balkans' mineral wealth is scattered over the entire region. The region is home to some of the largest mineral deposits left in Europe, including the Bor district in Serbia, with resources of 12 million mt of copper and 13 million oz of gold, the Panagyurishte district of Bulgaria with 5 million mt of copper and 7 million oz of gold, and a tertiary belt through Serbia, Macedonia and Greece which contains several major deposits including Trepcha and Sasa.

Turkish mining companies are also turning their eyes to the East. For historical and cultural reasons, the so-called Turkic repub-

lics are a natural recipient of Turkish investment. Construction companies pioneered the presence of Turkish companies in the region, and now mining companies are following suit. Many are also looking at Iran and its natural resources, but for the time being the country risk is too high for any sort of foreign investment in any industry. Opportunities are interesting only for service suppliers based in Turkey. "Most of the countries East and South-East of Turkey prefer to buy equipment via Turkey rather than in far-away markets. Here they can find a reliable banking system and good after sales support," said Dizel Turbo's Özdemir. The MTA signed cooperation agreements in resource-rich countries such as Uzbekistan, Turkmenistan, Tajikistan, Georgia, South Korea, Argentina and Indonesia. Turkish geologists are on the lookout for new opportunities. Whenever they find them, Turkish companies will follow.

For additional and up-to-date information on the Turkish Mining Industry, visit Turkey's monthly magazine at www.madencilik-turkiye.com

CORRECTION: In our Québec special published in November, we said that the FTQ Fund had invested in drilling tools manufacturer Fordia. That is incorrect. Sorry.

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