

Turkey's mining industry

A new day for mining dawns for a fast-growing regional power

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Turkey: An Overview

A rising mining market emerges in a challenging global context.



Divriği open-pit iron ore mine. Photo courtesy of Çiftay.

While the world's traditional mining markets struggle through the trough of a mining cycle, Turkey has emerged as a rare story of growth, offering a compelling jurisdiction to international mining investors in pursuit of friendlier skies. To date, the country has not shown huge ore deposits of blockbuster potential; rather its key attractions are economic discoveries ranging across 72 mineral types, situated in an open playing field with attractive incentives and a growing supplier base to assist in low cost project execution.

Aiming to become a top 10 global economy by the 100th anniversary of the Turkish republic in 2023, Turkey has set its sights

on reaching \$500 billion in exports, \$15 billion of which is earmarked to come from the mineral sector. With this ambitious goal in mind, the country is looking beyond the state-owned entities and domestic conglomerates that have largely fueled the industry thus far. Foreign investment will play a decisive role in meeting this goal, or falling short of the mark.

As the government continues its privatization process that began in the early 2000s, private companies have brought increased production rates and higher profits to a stagnant industry. Today the sector is over 85% privately-held, posting modestly healthy growth rates such as 4.6% in 2012, even as the global mining downturn began.

"Today just 10-15% of Turkey's mining operations belong to public bodies, such as Turkish Coal Enterprises (TKI), Turkish Hard Coal Enterprises (TTK) and ETI Maden. In the future, this ratio will be even smaller. We are ready to increase foreign mining companies' share in our country. To encourage these foreign companies, the Ministry of Economy has established new incentive schemes for strategic investments," said Nevzat Kavaklı, deputy undersecretary of the Ministry of Energy and Natural Resources.

Although the government is keen to support the sector with attractive incentives, as with any developing mining jurisdiction, a steep learning curve persists for policymakers bogged down by wider political and economic turbulence. Delays in forestry permits and a lack of clarity in regulatory implementation have slowed the sector's dynamic growth. Fraser Institute surveys placed Turkey 53rd in 2013, while 2014 results show improvement with a climb to 37 out of 112 jurisdictions. To continue on its upward trajectory, the sector is focused on luring in more foreign juniors and bringing the practices of its domestic players up to international standards.

Turkey's fast growing economy, boasting a GDP that has tripled since 2003, its young population with a median age of 29, and its central geographic positioning lend the mining sector strong fundamentals for growth. A period of wider economic uncertainty, which emerged in 2013 with the Gezi Park protests and an ongoing high-level government corruption probe, has been slightly abated by the highly anticipated local elections in March 2014, bringing indications for the August presidential elections and general elections in 2016. Investors have opted for a wait-and-see mode as the country tests the boundaries of its democratic process, yet stay at the ready for the green light to reactivate Turkey's booming mining story.



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Interview

Interview with Minister of Energy and Natural Resources, Taner Yıldız



Turkey improved significantly in the 2012-2013 Fraser Institute rankings. How are these improvements reflected in the recent growth figures of the mining industry?

Turkey ranks 10th in the world in the diversity of its minerals; however until 10 years ago the mining sector in our country could not reach its real potential. We, as government, have implemented the necessary legal arrangements for the mining sector to come to the place it deserves. Today, we know that 77 of the 90 types of minerals traded in the world are located in Turkey and approximately 60 of these minerals are produced here.

Please provide us with a brief overview of the main pieces of legislation governing sector licensing as they have evolved over time?

In 2004, with the enactment of Law No. 5177, the licensing process in Turkey was reformed to reduce bureaucracy in the sector. This increased the demand for mining license; however the absence of application criteria and the low cost of obtaining licenses have led to a high number being granted for speculative purposes and not exploration. As a result of this demand, the number of licenses rose to 45,900 in the early 2000s.

This created problems in the sector that were addressed with mining law No. 5995, which came into force in June 2010 and rearranged the length and requirements for the application and exploration periods. This reform removed the presence of speculative

licenses and paved the way for more exploration activities. After introducing this new law, private sector firms have significantly promoted exploration activity.

Following the enactment of Law No. 5995, the number of licenses has dropped from 45,900 to 23,475 as of December 31, 2013. This is a direct result of the elimination of investors who are not interested in actual exploration activity. While the number of license applications in 2010 dropped to 4,342 after the new law, they have since risen to 7,400 in 2013.

What is the importance of mining to the national economy and how do you envision its potential role as a growth driver going forward?

The mining sector's GDP in 2003 stood at about \$2.6 billion; in 2012 it amounted to about \$11.71 billion. By the end of 2013, it reached nearly \$12 billion. Based on this data, mining's share in GDP has increased nearly 4.6 times in the past 10 years. There has been similar growth in mining exports, which in 2003 amounted to \$841 million and increased six fold to reach \$5.1 billion by the end of 2013. We see these figures increasing going forward as the sector aims to reach its goal of \$15 billion in mineral exports by 2023, the 100th anniversary of the republic.

What steps is the government taking to advance exploration and improve the industry's understanding of its underground potential?

The amount of meters drilled in Turkey reached 1.5 million m in 2013, a significant increase compared to 100,000 m in 2002. Coal reserves have increased from 8 billion mt to 14 billion mt thanks to the new coal reserves identified by General Directorate of Mineral Research and Exploration (MTA).

What is your outlook for Turkey's mining industry in the near term?

Turkey aims to advance its mining sector which has good conditions today. In this context, we plan to raise the value of mining exports to \$20 billion from the current \$5.1 billion in the next decades.



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Finding its voice

Turkish mining regulations and financing

Turkey's mining code was most recently reformed in 2010, with the aim of clarifying the environmental permitting process and to discourage prospecting by instituting financial requirements and implementing a three-step exploration process complete with check-ins from authorities.

Regulations have not been significantly changed since then; however, questions of implementation and rule of law continue to challenge the sector. For a sector that has long been on the backburner of government policy, its emergent presence on the national stage has led to growing pains. Accounting for roughly 1.5% of GDP, the mining sector has a long way to go to gain a greater voice in the policy making process.

Güven Önal, chairman of the Turkish Mining Development Foundation, argues that official statistics do not tell the whole story of mining's importance to the national economy, a fact which is decreasing the sector's influence over policy. "The contribution of mining to GDP should be 1.5% in 2013; however the calculation of these figures does not give the whole picture of the industry. Mining exportation includes only raw material and does not take into account integrated mining activities, such as glassworks, ceramic works, cement, boron chemicals, copper, aluminum and power from the coal," he said.

"If we consider raw material production in Turkey and the contribution of integrated mining, this will lead to the real figure for its

share of GDP. Out of production in 2011, the integrated value was \$25 billion out of a GDP of \$750 billion, making the mining share 3.3%. The lower estimation of mining's contribution has an impact with NGOs and public relations," said Önal.

A light at the end of the tunnel for permitting

As evidence of the crucial need for a greater political voice on behalf of Turkey's miners, a significant bottleneck emerged for the industry in 2012, when a circular was issued by the prime ministry dictating that approvals for the use of governmental lands were to be routed through the prime minister's office. As a result, the mining sector saw a nearly two-year period of stagnation as forestry permit delays stalled exploration and threatened the industry's project pipeline.

Uncertainty of the application of the circular abounded and spurred collective action on the part of industry stakeholders.

"The circular issued in 2012 is vague and can be interpreted in many different ways. Recently, there has been a case, in which the circular was overruled. An applicant filed a lawsuit after the Ministry rejected the license application based on the circular. The court ruled that the legal right granted by a law cannot be limited by a circular," said Şebnem Önder, partner at Akol Law Firm.

While explorers and producers hoping to expand their operations have been forced into a waiting period, they have had the chance to hone their projects and prepare for swift executions of their drill programs once given the go-ahead. After a tense period, positive signs have brought investor confidence back to the market when, in advance of local elections held at the end of March, over 50,000 permits were sent back to the Ministry of Energy and Natural Resources for evaluation. As permits begin to receive ministerial approval, explorers and their service partners are hungry to get exploration re-started.

Reform initiatives to boost mining

The permitting delays have propelled discussion on further mining reform, prompting the industry to reach out to policymakers to better address the specific needs of their sector.

"Turkey has high potential in mining, but it needs a new legislative base in order to accommodate such a transition. The government is actively working on introducing tax incentives for foreign investment. The recent depreciation of the Turkish lira and internal political disturbances have slowed down this process, but we are confident the situation will improve towards the end of 2014," said Baran Baycan, partner at Baycan Law Firm.

Allegations of corruption among high-level government officials have rocked Turkey since December 2013 and the Turkish lira's value spiraled downward until the Central Bank raised interest rates in January 2014 in an emergency move that stymied its depreciation.

"In order to attract and retain foreign investors, we must provide investment incentives and tax advantages to local and international mining companies operating in Turkey. Turkish mining legislation has been updated regularly since 2005 to include such advantages, but there is still a long way to go," said Baycan.

A first step will be improving the framework for exploration. Current license periods make it difficult for explorers to carry out adequate research and the industry is advocating for an extension



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Baran Baycan, founding partner, Baycan Law Firm.

of exploration periods. "We are currently negotiating with the authorities to extend the exploration period from seven to 10 years for Class IV mines. The current period does not provide enough time to properly identify a gold reserve," said Ümit Akdur, chairman of the Turkish Gold Miners Association.

For producers, a more advantageous scheme of incentives exists. "Companies operating in mine extraction and/or processing have a number of incentives, including VAT and customs exemption, reduced corporate tax rate, social security premium support, interest support, land allocation subsidy, insurance premium support and income tax withholding allowance," said Tolga Taşdelen, director of tax services at PwC Turkey. "Additionally, wages of those employed in mines in the form of an underground operation, in ore production and in all related work, pertaining exclusively to the time they are employed underground, are exempt from income tax and stamp tax."

As Turkey adheres to EU accession guidelines, policy has been directed at better regulating its industries and improving their best practices. "The mindset in the industry has developed since the government started changing the laws and putting pressure on exploration and mining companies to meet international standards and report resources and reserves in a proper way," said Muhanned Arar, managing director of consulting firm Almina Minerals and Metallic Group general manager at Yildizlar SSS Holding, Turkey's only silver producer.

Accessing capital: Turkey's appetite for mining financing

Turkish conglomerates are bringing much-needed capital to the sector, however its path towards maturity will depend heavily on its ability to attract foreign investment. When Turkey first opened up its doors to foreign investment just over three decades

ago, investments coming from abroad totaled only \$18 million. In 2013, that number has risen to \$138.3 billion.

Although M&A in 2014 is forecast to drop to below half of its 2013 levels, opportunities abound in the market for companies with a high risk appetite. "The Turkish Republic is in need of FDI because of the large deficit in the national budget. The financing of this deficit, given the volatility with the Turkish Lira, and lower GDP growth, will have an effect on the country. Therefore, any international company looking to invest in Turkey is going to be regarded as a friend," said Zeynep Dereli, managing director of APCO Worldwide Turkey, a global strategic communications and advisory firm.

Because local banks have not displayed an appetite to finance mining, companies must rely on private investors, although the industry remains hopeful local banking interests will change. "Banks and financial institutions should focus on how they can create financial tools for mining and determine what the industry means to them in terms of revenue," said Şafak Herdem, managing partner at Herdem Attorneys at Law.

One rare example of local mining financing comes from DenizYatırım, the investment arm of Turkey's fifth largest privately-owned bank, DenizBank. As of 2013, DenizYatırım entered into a strategic collaboration with Dedeman Holding as its house bank to help finance its tourism and mining projects. "Within this framework we provided Dedeman Holding with M&A advisory services. We were given the task of optimizing the company's structure to help fuel its growth and ensure that the loan is paid back in an efficient manner," said Emrah Çelebi, M&A division head for corporate finance at DenizYatırım.

The high risk nature of the industry has made it less attractive to local finance; however on a global scale Turkey's mining market has several risk mitigation advantages. In 2013, Ernst & Young identified the top three global risks for mining as resource nationalism, skill shortage and infrastructure access. On these fronts, Turkey is relatively well-positioned; rather risk comes in on a policy level.

"Turkey is suffering from a delay in investment, often related to political issues. Infrastructure access in Turkey, compared to some of the developing countries, is among the best and there is no skill shortage thanks to the number of universities," said Hakan Kayganacı, managing director of the risk management practice at insurance broker and risk adviser Marsh.



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Gold

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Kışladağ gold mine at Uşak. Photo courtesy of Tüprag.

As gold producers struggled globally through price drops in 2013, Turkish gold producers reached peak production with an output of 33 mt. Turkey entered into full-scale commercial production only 13 years ago and today is Europe's top gold producer, with eight mines and several near-term developers waiting in the wings.

Representing the sector since 2006, the Turkish Gold Miners Association and its 24 members have supported the country with significant investment. "Over the last 28 years, our members have invested some \$2.5 billion in Turkey. Of that investment, \$800 million was for exploration and \$1.7 billion was in mining. In 2013, we produced 33.5 mt of gold, which created some 6,000 jobs," said Ümit Akdur, chairman of the Turkish Gold Miners' Association.

"We expect to increase gold production to 50 mt by 2016. However, there are a number of challenges which may prevent the industry from achieving this. Lower gold prices and deferrals in permitting, especially forestry permits, have put a lot of pressure on mining companies," said Akdur.

Nonetheless, forecasts for gold production in 2014 are set at 35 mt. This higher output is thanks to Turkey's leading gold producers' continued expansion efforts. In 2013, Turkey's first domestic gold producer, Koza Gold, commenced construction of its Himmetdede mine and heap leach facility in the Kayseri Province. Entering into production within 2014, the operation will be the fourth process plant of Koza Gold and the third constructed in the last five years.

At ASX-listed Alacer Gold's 80%-owned Çöpler mine, the miner achieved a record year of gold production in 2013, with

216,850 attributable oz produced in a 44% increase over levels in 2012. The company has forecast production in 2014 to be greater than 160,000 attributable oz as the miner transitions from mining oxide ore to sulphide ore.

For its part, Tüprag, the Turkish subsidiary of Canada-based mid-tier Eldorado Gold, is currently producing 300,000 oz/y of gold at its Kışladağ and Efemçukuru operations. Pending permitting approval, Tüprag will significantly increase its capacity with a plan to increase its processing up to 35 million mt/y of ore. "The proposed expansion in Kışladağ will contribute greatly to the gold sector's goal of reaching 50 mt/y by 2016," said Mehmet Yılmaz, director at Tüprag.

Digging for gold

Given gold's impressive growth story in Turkey, international juniors have clamored to enter the market while Turkey's conglomerates and construction companies eye gold potential.



Ümit Akdur, chairman, Turkish Gold Miners Association.

Chesser Resources, an ASX-listed junior, is concentrated on its flagship Ke-stanelik project, an epithermal low sulphidation gold project in western Turkey. With over 70,000 m drilled on the project to date, Chesser is now planning for the completion of its prefeasibility study and a resource update by mid-2014.

Chesser stayed active in drilling in spite of the prime ministerial circular thanks to an aggressive application strategy before the decree went into effect. "In 2010 and 2011, we got massive amounts of drill site permits. This was to ensure we did not face any legal challenges if anything was to happen with the forestry law. Financially, forestry permits cost a lot. Sometimes you have to pay for permits you would never use, but this is the nature of the business and the cost that you have to pay. Chesser resolved to pay it and today we have existing permits," said Cem Yüceer, general manager of Batı Anadolu Madencilik, the Turkish subsidiary of Chesser Resources.

Chesser is part of a select group of international-standard explorers tapping into Turkey's sweet spot for mid-sized projects ideal for juniors with midcap ambitions. "In Turkey, small entrepreneurial national or international companies are the catalysts of the exploration industry since they make quick-low cost discoveries which then are developed by larger investors," said Sabri Karahan, general manager of DAMA Engineering, a boutique engineering firm with expertise in exploration and development.

While the geological environment remains favorable, explorers will have to battle typical challenges that come with developing mining destinations. "Exploration



Mehmet Yilmaz, director, Tüprağ.

companies are dealing with the challenges of raised property acquisition costs during the early phase of exploration, red-tape and unrealistic time frames for getting into operation mode; these work as discriminatory barriers for them. Following the elections in March and in August 2014, it is expected that the government will revert to industry friendly attitudes and encourage exploration and mine development,” said Karahan.

In spite of these challenges, near-term development projects are advancing in the country, such as Toronto-based Aldridge Minerals’ polymetallic Yenipazar project has, in addition to its gold reserves, copper, silver, lead and zinc potential. After receiving EIA approval in late February 2014, Aldridge is aiming to complete post-feasibility studies.

“We are completing an additional engineering study to review all equipment and mine design costs to reduce capex. According to the feasibility study, we had a \$382 million capex, and after the additional study there will be a substantial amount of reduction on capex with no impact on the opex and throughput estimated in the definitive feasibility,” said Serdar Akca, vice president and country manager for Aldridge Minerals.

Opting for a joint venture model, UK-based Ariana Resources, through its Turkish subsidiary Galata Madencilik, has partnered with the Turkish construction firm Proccea Construction to develop its Kiziltepe gold-silver project. The joint venture, under the name of Zenit Madencilik, brings together Proccea’s experience in building gold mines, and Ariana’s exploration expertise in the Balıkesir region.

“We are advancing steadily and moving towards gold production of approximately 21,000 oz/y in the next five years,” said Erhan Şener, general manager of Ariana Resources in Turkey. “After evaluation of the EIA report, we will begin applying for the necessary permits to set up a plant. Ideally, we are looking to receive these permits in

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MINING IN TURKEY

three months, and finish the construction process in 10 months.”

Among international players looking to round out their portfolios in the region are Vancouver-based Pilot Gold, which is advancing its TV Tower gold project in the Biga district, and Toronto-based Centerra Gold, which has operating mines in the Kyrgyz Republic and Mongolia. Centerra is advancing its Oksut gold project in Turkey, releasing a PEA in February 2014.

“In 2013, we continued drilling on the Oksut property, and upgraded the initial resource estimate and converted most of the inferred resources to indicated resources category. We now have 1.1 million oz indicated resources on the property at 1.2 g/mt. The preliminary economic assessment indicates a potential for two small open pit heap leach operations with an 11 year mine life. We are now proceeding to a full feasibility study on the property and we will continue to do drilling this year,” said John Pearson, vice president of investor relations for Centerra Gold.

With a plan to spend \$10 million in 2014 at Oksut, including \$6.4 million for technical studies, environmental and social impact assessments and another \$3.5 million on further exploration, Centerra is aiming to commence production in late 2016.



Tolga Balta, managing partner, Encon Environmental Consultancy Co.

“The PEA indicates that the property can produce about 125,000 oz/y between its fourth and sixth years,” said Pearson.

Another near-term developer, Alamos Gold, is advancing its Kirazli and Ađı Dađı deposits in Çanakkale after entering into the market in 2010. “We have the EIA report already approved, but an injunction decision by the administrative court is stopping the execution of the EIA report. Now we are at the stage where we are waiting and looking to update the EIA report with a cumulative impact assessment. We have answered the invitation for foreign investment in Turkey and we are ready to spend



Ecevit Iskender, company manager, Pozitif Drilling.

\$450 million,” said Hasan Ünsaç, counter manager for Alamos Gold.

Further down the value chain

Adding to Turkey’s promising gold potential, downstream added-value improvements are opening up the country’s future as a gold trading hub. The refinery business in Turkey only began to develop over the past 15 years when the Istanbul Gold Refinery (IGR) was established. IGR has enlarged rapidly and has received accreditation by the London Bullion Market Association, along with two other Turkish refineries; Atasay Kuyumculuk and Nadir Metal Refinery.

Among Turkey’s advantages as a gold refining hub are favorable labor costs compared to the European markets. “Turkey’s location is also very strategic when it comes to refining and global trade. Dubai has gained its central position because of their very open market, but this could change in favor of Turkey. Turkey plays a very important role because a lot of trade is going through the country and we have good relations with surrounding countries,” said Aysen Esen, general manager of IGR.

Given the high level of price fluctuations in global market, high domestic demand for gold and a growing appetite for gold imports, Turkey has good potential. Once markets stabilize, this is set to take off at a larger scale.

“Because of market fluctuations and the changes in gold price, imports were very high in 2013 compared to the previous year—nearly two to three times more than past years’ values. Exports were very low compared to the values of previous years in Turkey,” said Aysen. “While the price differences have not been big, the fluctuations are. That is why the market is waiting—buying and selling continues on a small scale, but big purchases and sales are not happening.”



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Towards a gold standard: Gold miners improve HSE practices

Environmental concerns over cyanide usage led to turbulent beginnings for the gold sector, yet gold miners have emerged as leaders in elevating the wider mining industry's HSE practices.

Encon Environmental Consultancy, a local firm working primarily on gold, silver and nickel projects, took its experts outside of Turkey to develop the necessary expertise in precious metal processing. "We know these enrichment processes very well. Before beginning consulting in this field, we spent two months in the United States with our team visiting 50 mines from Denver to Reno to understand the magnitude of what we are dealing with," said Tolga Balta, managing partner of Encon.

Tüprag, which introduced heap leach gold processing to Turkey in order to exploit low grade gold mineralization, has prioritized its environmental work to ensure that their operations have no harmful impacts.

"After our start-up, our activities have been monitored by two different governmental officers because our work is in two different provinces. In terms of water and air quality, noise and vibration and other environmental factors, we have always been far below the threshold, which is important to us," said Mehmet Yılmaz, director at Tüprag. "We are proud of opening mines and operating within international standards while keeping friendly relations with the local people. These goals put a lot of value on our operations, because social license is very important in terms of making a successful, peaceful and technically sound operation."

As the public becomes savvier with regards to gold mining, obtaining the social license to operate is an increasingly crucial step for project development. Careful attention on the part of not just miners but their service providers has made a marked difference in the feasibility of projects.

In this respect, Pozitif Drilling was founded in 2007 as a drilling services provider with a focus on HSE and community relations. "Training is a big issue in Turkey. We understand how local communities react to mining companies and drilling activities and we make sure to extend training to people in the surrounding areas," said Ecevit İskender, company manager of Pozitif Drilling.

"Before we go to the site, we collect data, make investigations into the area's socio-economic level and discover if there is any sensitivity in the region to mining. When we arrive on the site, one of the first things we do is to train people about health and safety issues and the environment. We give them good information to mitigate the adverse impacts of the jobs we are doing there. We also put emphasis on giving jobs to the local people," said İskender.

Often in environmentally sensitive areas and traditionally agricultural zones, gold miners have put a premium on incorporating local communities into their activities. "Koza Gold has executed an accurately planned community relations program at all of our operations. We recruit over 80% of our personnel from the local community and we prefer to work with local suppliers as much as possible, depending on their capacity," said İsmet Sivrioğlu, general manager of the company.

Tüprag echoes this sentiment with its local outreach work, bringing in an average of 75% of its workforce from the areas surrounding its operations.

"In Kışladağ, the local content number is closer to 80% because the project is older and we have spent more time on training, in order to generate more human resources locally. In Efemçukuru, the number is around 60%, because it is a metropolitan city and workers are coming from everywhere. Our preference is always to hire lo-



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cally, which helps the project. If you have employees from nearby, the local people feel it is their project," said Yılmaz of Tüprağ.

Refining the EIA process for the greater good

As industry players have established environmental track records and expanded their corporate social responsibility activities, the sector's most pressing challenges from an environmental perspective have shifted to its regulatory framework.

Turkish EIA requirements have not yet been streamlined to international standards, creating the need for companies seeking bankable feasibility to conduct separate studies for domestic permitting and global financing. Among their divergences, the Turkish EIA does not take into account the social aspect of projects.

"On paper there are some differences between the two, like public participation and stakeholder engagement. For projects where international lending is needed, we make a gap analysis between Turkish and international lending needs and look at what extra work needs to be added into our roadmap for the execution of the project," said Balta of Encon. "There needs to be about 15 to 18 months for the preparation of a baseline study, completing the EIA report and receiving a permit. In total the process should take a minimum of two and a half to three years to receive your license for operation."

Turkish regulation has introduced a cumulative impact assessment (CIA) requirement that will improve industry responsibility, yet is also complicating the EIA study process. Projects without CIAs have seen their EIAs go into litigation, as in the case of Alamos Gold, prompting the industry's consultants to adjust their study plans.

"Even though CIAs have been widely used for international projects, this is a new subject for the Turkish EIA process and it shows that local EIA standards are moving closer to international ones, said Meryem Tekol, managing director of Golder Associates Turkey.

"Cumulative impacts are defined as incremental effects caused by past, existing and reasonably predictable activities in the future besides the project. A sound baseline database and knowing the impacts of existing and future projects is crucial for CIA studies," said Tekol.

The mention of a CIA requirement came out in October 2013 in the one of the appendices of the EIA regulation. In the absence of explicit guidelines, companies are challenged to access the necessary information to conduct these studies. "You have to consider what other developments are happening in the project area currently or that you can foresee and then assess the cumulative impacts. As a private company, you cannot go and start asking these questions to other companies. The government should have a database or sectoral/regional CIAs where companies can find this information but this has not developed yet," said Bora Arpacioğlu, general manager and principal environmental engineer at SRK Consulting Turkey.

"Considering the current uncertainty regarding the regulators' requirements for CIAs, we will continue using international standards and our project experience until a guideline is published by the regulators," said Serhat Demirel, senior geological engineer and office manager at Golder Associates Turkey.

Further preempting gaps on the international level, SRK Consulting in Turkey has started to adjust the preparation of EIA studies to also meet international standards in all aspects where Turkish regulations are not sufficient, such as with regards to archaeological finds and biodiversity. "We are working with clients to convince them to go beyond the minimum requirements and follow international industry best practices," said Arpacioğlu of SRK.



Çayeli copper mine. Photo courtesy of Çayeli Bakır.

In contrast to gold, which has been a private sector endeavor, base metal production in Turkey has a legacy from the decades of state-owned operation. As privatization continues, with a General Director of Mining Affairs (MIGEM) tender held most recently in April 2014, private companies are moving into the base metals space to fill the gap of a growing base metals deficit.

“The key driver in Turkey is the balance of payments deficit. The economy has been growing at one of the fastest rates in the world for the last 10 years, which has caused a huge demand for raw material and metals like lead, copper and chrome. We are looking at a negative balance of payments of \$140 billion by 2023 if we do not do not develop our resources and produce metals at a faster rate,” said Alan Clegg, chairman of Afrasia Consulting.

“There is a lot of mineral potential within the country, but all is exported as raw material. Today, in Turkey we are using about 1.2 million mt/y of aluminum, but our domestic production is 120,000 mt/y. It is the same situation with copper. Turkey has many copper deposits and a copper use of about 470,000 mt/y, while production is only 50,000 mt/y. We are also importing about 340,000 mt/y of lead-zinc every year,” said Önal of TMDF.

Boosting production in Turkish base metals

Copper has a longer history than most metals in Turkey thanks to ETI Bakır, a former government producer complete with a smelter that is now owned and operated by Cengiz Holding, one of the largest mining investors in the country. With an annual copper concentrate production of 250,000 mt/y, ETI Bakır plans to increase copper production through international-standard exploration projects surrounding their operations, in addition to a plan to double smelter capacity by 2016.

Bringing Canadian expertise to the industry in copper production, the Çayeli Bakır mine in northeastern Turkey became part of First Quantum Minerals when the growing metals producer acquired Inmet Mining Corp.’s assets in 2013. The last three years have set production records at Çayeli Bakır with a major continuous production improvement yielding an increase of 8% last year. Production is slated to increase further yet for 2014, with 28,000 mt/y of copper and 35,000 mt/y of zinc.

With a current mine life until 2019, Çayeli Bakır is focusing on extending its operations. “Our current program tackles extending

the resource and reserve on three fronts. One is exploration of new areas; we have recently carried out a major soil sampling program on our mining concessions. The second part is the extension of the existing ore body; and we have identified opportunities to drill areas where we previously had limited data. Thirdly, we are working on the existing ore body and identifying lower grade areas that are economic and we can bring into the reserve,” said Iain Anderson, managing director of Çayeli Bakır.

Capacity expansion and new investments on the part of Turkish holding companies is also helping to boost production. Leading

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mining conglomerate Ciner Group, which, among its mining assets, has copper operations, has achieved a run of mine output increase to 1.6 million mt/y in the last two years at its copper mine.

Eczacıbaşı Esan, the mining subsidiary of Turkish holding company Eczacıbaşı, has parlayed its three decades-long leadership in industrial mineral supply to enter into the base metals space. "In 2009, with the opening of Balya Balıkesir zinc and lead plant, metallic minerals production became a substantial part of Esan's operations. As of January 2014, the plant has reached 30,000 m total gallery length and 700 m depth which makes it the deepest lead and zinc mine in Turkey. The Balya lead and zinc plant has a yearly capacity of 1.1 million mt/y of underground production and 120,000 mt/y of concentrated production," said Serpil Demirel, assistant general manager of Eczacıbaşı Esan.

Özdoğu Construction and Trade Co, on the other hand, began its involvement with the mining sector through contracting and has since moved into two main operations: a ferrochromium operation and copper project. Located in Antalya under the name ETI Electrometallurgy Inc, Özdoğu mines chrome ore and operates the first low carbon ferrochromium plant in Turkey.



Multi pouring of 84 geochem sample set fusion for gold determination by fire assay. Photo courtesy of SGS.

"The operation was acquired from the government in 2000 during the privatization process. We increased its capacity and made renovations with new technology and last year we exported 22,000 mt low carbon ferrochromium and calcium carbide. Our company has partnered 50/50 with Aksu Mining in this endeavor. ETI Electrometallurgy has 12 chrome mines with an annual production capacity of 100,000 mt/y," said Murat Kavak, vice president of the board of directors at Özdoğu.

Özdoğu's second mining operation, North Aegean Copper Enterprises, produces copper and molybdenum. "After purchas-

ing the operations in 2007, we opened our plant last year. We have approximately 55,000 mt/y copper concentrate and 2,500 mt/y molybdenum concentrate production at grades of 25% to 30% copper and 55% to 57% molybdenum. Last year, we were the number one exporter of copper and molybdenum in the Aegean Exporters' Association," said Kavak.

Exploring to quench base metal thirst

While deterred by drilling permit delays, base metals exploration has continued with a focus on new technologies. Pasinex Resources, a public mining company listed on the Canadian Securities Exchange and focused on base metals in Turkey, is advancing two flagship projects, the 100%-owned Golcuk copper project in Sivas province, and the Horzum zinc project in Adana, which is being developed in a joint venture with Turkish mining company Akmetal.

"At the moment, Pasinex's aim is to expand its prospective surface area mapping using the ground penetrating radar. Applying this modern exploration technology allows us to look at potential rock structures that contain zinc. With regards to our zinc project, the two main properties Pinargozu and Akkaya are where we are focusing most of our attention. We have already carried out a number of geochem studies and geological mappings in the area and we are seeing excellent potential. This has brought us closer to the drilling stage. In the meantime, through ground penetrating radar (GPR) we are looking at zinc compositions that are concentrated in limestone hosted caves," said Steve Williams, CEO of Pasinex.

After a long waiting period, explorers are ready for an upswing of activity now that drill permit applications have been released as of March 2014. "The Prime Minister's office decree affected the whole industry, and left many mining companies frustrated. On



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our end, we chose to work on geochem, geophysics and geological mapping to help us understand our projects and become better prepared for the drilling stage," said Williams of Pasinex

Going the distance: Turkey's role in the global base metal market

Turkish base metals producers are looking at home and abroad to meet global demand for base metals. Close to many growing markets, Turkish producers have a transportation cost advantage reaching key markets such as Russia, China and North Africa.

European demand is also improving base metal fundamentals in Turkey, which has less restraining policies than its European counterparts in need of critical raw materials. Chrome, in particular, has a quality and cost advantage in Turkey. "The demand for Turkish chrome is high, as it is one of the main producers besides South Africa. The quality of Turkish chrome is also much higher than other countries in the region, like Albania," said Soner Koldaş, CEO of chrome miner Turchrome. "We are waiting for the price of ferrochrome to improve and we are optimistic about the future of the market due to Turkey's stability".



Alp Malazgirt, CEO, metals and mining at Yildirim Group.

While Turkish producers are proving themselves competitive in the global market, export rates are waning in relative value due to the increasing attractiveness of their own backyard.

"We have exported our products in the past, but for now we are mostly focused on the Turkish market. We see a local shortage of copper cathode supply and we have seen some international companies limiting their supply to Turkey. It makes sense for us to stay in the market, where there are no freight issues and the premiums are good," said Zeynep Cengiz, director of sales at Cengiz Holding.

Recognizing the need for geographic diversification, however, base metal producers such as Turkish conglomerate Yildirim Holding are looking for investments abroad. Yildirim, one of the country's top chrome producers, moved into mining in 2003 with the acquisition of Eti Krom from the government. After making its first international acquisition in 2008 with the addition of Swedish company Vargön Alloy, Yildirim became the second largest high-quality carbon ferrochrome producer in the world and the largest exporter of chromite in Turkey.

Undeterred by declining chrome prices, Yildirim further expanded internationally with the 2013 purchase from Russian company Mechel of the highest grade chromite ore body in Kazakhstan, the Voskhod chrome reserves and mining plant and the Tikhvin Ferroalloy Plant in Russia.

"It is a very good deposit that allows easy production at a relatively low price. After this acquisition, our reserves and production levels have increased dramatically," said Alp Malazgirt, CEO of Metals and Mining at Yildirim. "In the near future, we are interested in becoming a technology-driven company in ferrochrome. Diversification through our local and international assets allows us to be flexible and to withstand global commodity price fluctuations."

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Solving the mineral processing challenge

Turkey's wealth of polymetallic deposits requires careful attention to processing strategies, which can make or break a project. As the low hanging fruit of Turkey's geology is mined out, developers are prioritizing processing research and working more closely with industry partners who provide them with in-country expertise to solve processing challenges.

"In Turkey, easy mining methods are no longer valid. Extracting ore is getting more complicated and companies have to complete more drilling and do more scientific work. For this reason, a lot of samples should be taken and mineral processing methods, flow sheets and pilot tests should be carried out to give an initial idea about costs and grades. With the example of copper, minerals like sulfur contaminate the ore and it must be pulverized on a very small scale, which increases the cost," said Emin Ulu, company manager at Argetest, a private mineral processing laboratory founded in Turkey in 2012.

As the capacity for mineral analysis expands in Turkey, project developers have more in-country partners from which to choose. International player Acme Labs established operations in Ankara in 2006 to cover the Eurasian region. Originally housing only a sample preparation laboratory, from which samples were sent to Vancouver for analysis, Acme Labs has increased its local capacity due to growing demand in the industry for analysis to be done on the spot. "In Turkey we have the largest fire assay capacity, which is a crucial method to obtain gold and silver valuations. We are working on base metal packages in-country and we will begin providing ICP-OES results to our clients in Q2 of 2014," said Nezih Doğu, country manager for Acme Laboratories.

"In the past two years, Turkey's laboratory industry has moved from prep labs to analysis itself. Previously, only local Turkish labo-

ratories carried out analytical work, but the quality was much lower than what it is today. With the advancement of foreign investment and know-how, the quality of lab work has improved significantly," said Doğu.

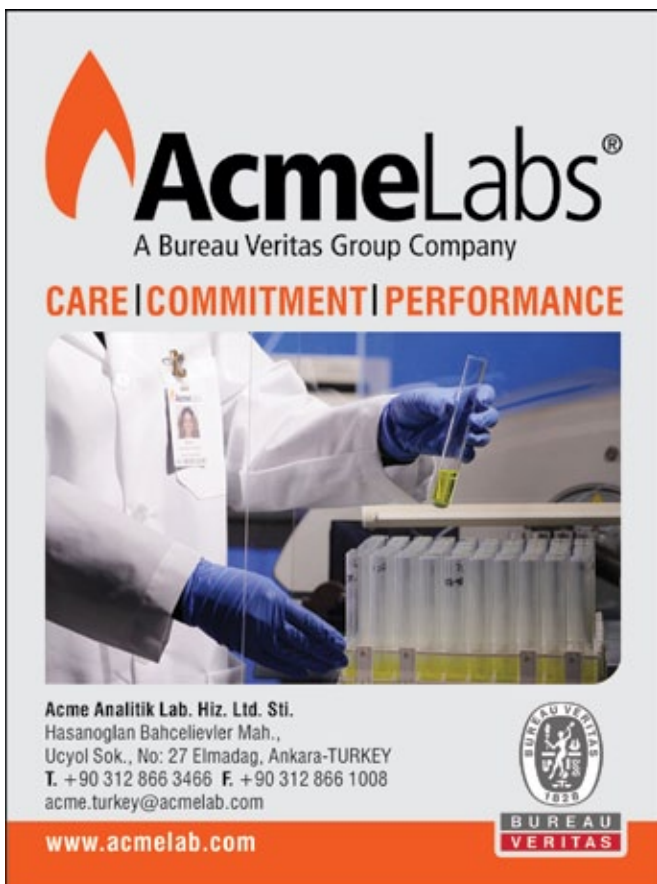
The next hurdle for Turkish laboratories is to acquire 17025 accreditation in order to better service clients looking to access global stock exchanges. "Acme Analytical Laboratories Turkey branch is working on accreditation. Hopefully we will be receiving 17025 accreditation on fire assay and base metal packages within the year," said Doğu.

SGS, which opened up a geochemistry laboratory in Ankara in 2012 to meet the high demand for laboratory services, is also hoping to receive 17025 accreditation within the year to serve not just Turkey but also surrounding countries. "Turkey is well positioned to serve the region, including both the Middle East and Eastern Europe. Now the lab in Turkey receives samples from Former Yugoslavia, Georgia and Armenia. SGS Turkey has also done exploration work with clients from as far as Senegal," said Evgueni Terentiev, laboratory manager for SGS Minerals & Metallurgical Services in Turkey.

Dealing with Turkey's complex geology, laboratories are prepared to offer complex analysis packages to customers. "In most cases, gold is complimentary to base metals or in equal part. Mostly, our clients ask for complex packages that work with PGM, gold and base metals," said Terentiev.

"Previously, companies were extracting their ore, crushing it and selling it. Now we have lower ores and need more beneficiation, so we need more experiments, more reactivities and more test laboratories," echoed Abdullah Buhur, company manager at Argetest.

With 17025 accreditation on the horizon for Turkey's mineral laboratories, the country is poised to play a more crucial role within the region's mining market.



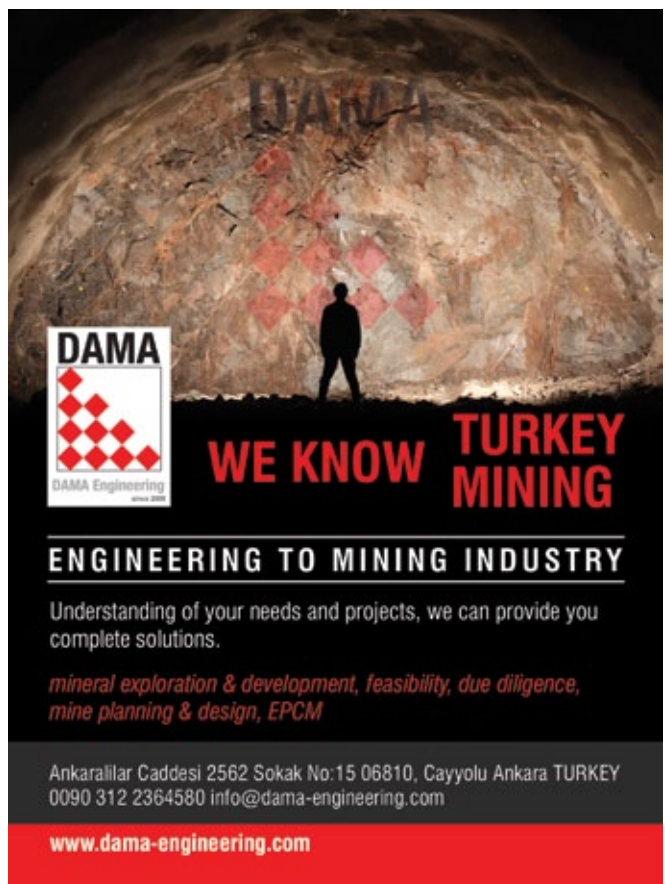
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Coal

Feeding Turkey's Appetite for Energy

In a more favorable position than Turkey's metal miners, who are dealing with declining prices and permitting delays, Turkish coal producers have been boosted by Turkey's growing need for power and an advantageous government incentive scheme aimed at increasing the country's power generation capacity.

Energy demand in Turkey doubled over the last 20 years and is expected to double yet again within only the next decade to feed a growing economy and a young population. With the vast majority of Turkey's hard coal supply coming from abroad, the government has identified indigenous coal reserves as a crucial step towards energy independence. As part of Vision 2023, coal-fired power is set to meet up to 10% of the country's energy needs.

Coal consumption in Turkey has doubled since 1990 and continues to grow faster than local production. In 2011, 104 million mt/y of coal was consumed domestically, while local production came in at 76 million mt/y. Over the last decade, coal production in Turkey increased by nearly 10 million mt/y but has leveled off in recent years and only reached 65.4 million mt/y in 2012. Making up the difference, imports are coming primarily from Russia and Colombia.

Given these dynamics, it was forecast that coal imports would grow by 25% in 2012-2013; however in reality imports fell by 12% in that period coming in at 20.9 million mt/y as the Turkish Lira has depreciated and domestic coal has become increasingly attractive.

Developing Turkey's hard coal and lignite reserves

In spite of quality and extraction challenges, the 10 million mt/y boost in coal production in the past decade is attributable to the ongoing privatization of the sector. The sector remains largely in the hands of state-owned enterprises, accounting for 90% of operations, however 35% of this state production is carried out by private subcontractors. As operations transition to the private sector, improvements in exploration and production will continue.

"In 2005, Turkey had reserves of 8 billion mt of coal. Today our reserves are 14 billion mt because of the many drill pro-

grams made by the private sector and by the General Directorate of Mineral Research and Exploration (MTA)," said Alp Gürkan, chairman of private coal company Soma Group.

Since 2005, coal exploration in Turkey has reached 200,000 m drilled over 30,000 km². Recent drilling programs carried out by Soma in the Black Sea district of Merzifon at the Yeni Çeltek mine, which has been producing for over 25 years, have brought in roughly 25 million mt of new high quality coal reserves. In line with government incentives, after ramp up a coal-fired power plant of 300 MW will be erected on the site.

For its part, Ciner Group, which has also invested in both coal mining and power generation, operates a state-owned 620 MW plant in Çayırhan by concession agreement which they fuel with coal mined underground. Ciner is also commissioning a three unit power plant in Silopi, 7 km away from the Iraqi border, which by end of 2014

should produce over 400 MW. Ciner is mining 1.2 million mt/y of asphaltite for the Silopi complex, which provides 4,000 kcal/kg when burned.

While the sector is boosted by both government support and growing demand, it has been held back by challenging geology and low heat content. Turkish coal reserves are primarily lignite, only 6% of which has a calorie value over 3,000 kcal/kg.

Compared to its 11.7 billion mt of lignite resources, the country has roughly 1.3 billion mt of hard coal, concentrated in the Zonguldak area on the Black Sea coast and ranging in heat content from 6,200-7,200 kcal/kg.

To confront the challenge of low calorific value coal reserves, many companies are putting investments into R&D such as Düzgün Mining Co., which produces 1.5 million mt/y of brown coal in Konya Province. "We are running a project with the Scientific Technology Research Council of Turkey (Tübitak) to build a plant to dehy-




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Alp Gürkan, chairman, Soma Group.



Yücel Picakci, country manager, DMT/IMC.



Sami Demirbilek, president, energy group at Ciner.

drate coal, which makes it better quality," said Şenol Seyhan, general manager of Düzgün Mining Co.

"There are other coal drying facilities in Turkey, but they are using different technologies. In most coal mines, the coal drying machines are rotors, which is very old technology. Our plant will improve upon this system using a rolling mill made from ceramic. This new technology will increase calorie count from 2,000 kcal/kg to 3,000 kcal/kg," said Seyhan.

As coal projects go ahead, the service sector is honing its coal expertise to find new projects in a tough climate. "Coal is a large focus for DMT/IMC given its strategic importance to the country. Turkey will need 15,000 MW of electricity in the coming years, and the country needs more coal mine development to build coal power plants," said Yücel Picakci, Turkey country manager of DMT/IMC.



Belt cleaners. Photo courtesy of Martin Engineering.

DMT, an engineering and consulting firm based in Essen, Germany, is bringing its exploration and production planning to the mining sector in Turkey through its IMC consulting subsidiary. "Germany is number one in the world for coal mining in terms of technique and mine planning. For our geological surveys, we bring in our experts from Germany who are internationally accredited," said Picakci.

Government incentives target coal-fueled power

To help the sector along, the government has introduced a scheme of incentives to encourage coal production and subsequent coal-fired power plant developments. A revision in spring 2013 to the scheme included the addition of coal with high calorific value.

Within the scheme of incentives that can be applied to coal-fired power plants based on indigenous coal, a power plant of 1,000 MW or more that enters into commercial operation by the end of 2014 will have a purchase guarantee from Turkey's Electricity Generation Co (EUAS). Further incentives include the coverage of expropriation costs and the building of transmission lines. Exemptions from license fees also apply to electricity market legislation.

Coal incentives are attractive, though there remains room for improvement, particularly with regard to license areas that are limiting development opportunities for the private sector.

"The challenge for the industry is that most of the coal fields are in the hands of TKI. The private sector has coal fields, but its licenses are divided into small packages each having 5 to 10 million mt of reserves. This does not make any sense from a power generation point of view. It is very difficult to bring the licenses together and establish 90 million mt of coal reserves that can produce 3 million mt/y and fire a 300 MW power plant," said Sami Demirbilek, president of the Energy Group at Ciner Group.



Brown coal mining quarry at Ilgın county, Konya province Photo courtesy of Düzgün Mining Co.

Developing a Strong Supplier Base

Local and international firms bring means of cost-cutting and innovation to Turkey's miners.



Diamond core drill site at North-West of Turkey. Photo courtesy of Pozitif Sondaj.

Attracted by the region's potential, more global service providers are setting up in Turkey to serve Eurasian mining, and more local companies are reaching international markets. Building on Turkey's existing industrial strength, particularly in construction, Turkey's mining supplier base has a degree of sophistication unique to most developing mining markets. "The Turkish construction industry not only is very mature but also ranked second to China in the international market. Therefore, the construction industry is not only capable within the borders of Turkey but also an industry that has been very successful outside of the country. The major risk of capital execution in Turkey is somewhat marginalized and accordingly is one of the main advantages of Turkey in mine development," said Han İlhan, president and CEO of Aldridge Minerals.

Drilling: Meeting international standards as exploration goes deeper

Permitting delays and the global downturn have taken their toll on the drilling market, causing many rigs to sit idle in 2013. "Now, there are about 700 rigs available in Turkey. However, only 40% are being utilized. This is on par with the worldwide average of 35-40%," said Bülent Şahhüseyinoğlu, CEO of Mapek, exclusive Turkish agent for Boart Longyear rigs.


With the industry expected to pick up in the latter half of 2014 and 2015, suppliers such as Mapek are preparing new product offers to meet the advancing technological requirements of exploration.

"We have new technology and innovation, such as sonic drilling from Boart Longyear. When the market accelerates again for exploration drilling, there will be a demand for these more high-tech rigs," said Şahhüseyinoğlu.

Spektra Jeotek, a Turkey-based global drilling services and manufacturing company, began operating on its fourth continent, North America, with the acquisition of Forages Mercier in 2012. "All over the world we have 98 drill rigs. Not all of them are in operation in this difficult time but it creates a lot of opportunities to prepare for the coming cycle," said Levent Okay, president and CEO of Spektra.


"We made a lot of investments, such as in our new manufacturing building of more than 22,000 m² just to get ready for our aggressive growth plans in the next cycle. Within this year and next year, we are looking forward to acquiring new companies, especially in South America, which is our next target market," said Okay.

Working in Turkey, which offers a strong but small market, international players can bring much needed drilling expertise to an underexplored jurisdiction. "We have good experience working with Turkey's complex geology which can easily translate to other countries and put us in front of our competitors. For example, we did not have experience in directional drilling in our region because this is not common in Turkey. Spektra has succeeded in acquiring this experience through our acquisition of Forage Mercier. We are drilling a lot of directional holes in Canada which we can now bring to our operations in other regions," said Okay.



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To introduce more cost efficiencies into the drilling process, service providers in Turkey are moving into manufacturing. “In 2007, when we established Pozitif Drilling, we had our rigs manufactured by another company; however we found that we were not able to get the level of service that we wanted, so we established our sister company. This allows us to modify rigs to give better service to clients. We can now design and commission custom-built multipurpose rigs with different capabilities based on clients’ specific requirements,” said Iskender of Pozitif.

While the diamond drilling market is well covered in Turkey, opportunities remain in reverse circulation (RC) drilling. Global Magnet Group, an Australian-based company, established a presence in Turkey to provide RC drilling services and has plans to expand in the market to bring in unmanned aircraft geophysics and exploration project development.

“We completed a 10,000 m drilling contract for an Australia-based company with projects in Turkey in 2013. Going forward, we just signed a first drilling contract with Alacer Gold and another with a locally-based Turkish company this year. We are hoping it will flow on from there and we will be drilling between 10,000-30,000 m this year,” said Leo Pilapil, business development manager for Global Magnet Group.

“Mining-wise, Turkey is relatively unexplored and does not have advanced or sophisticated exploration techniques. The deposits that are easy to discover have been already found; in areas where there is relatively flat ground with easy access, outcrops, old workings and where it is easily sampled. Where there are no outcrops, it can be difficult to know what methods to employ. Having spent the majority of our time in Australia where there are no outcrops and the rocks are much older, we have developed more appropriate techniques such as airborne geo-



Levent Okay, president and CEO, Spektra.

physics and low-level geochemistry to look at areas without any outcrops," said Pilapil.

Drillers have also relied on other markets to stay alive in the mining downturn, expanding to geothermal and oil and gas drilling and also targeting mining projects outside of Turkey. Thanks to diverse project experience, Turkish drillers are finding themselves in demand in the global market, such as in the case of Ortadoğu Drilling. "In Pakistan, Ortadoğu has been chosen as a partner in a joint venture with Fugro to work on a Pakistani government iron mine. As the slim hole exploration technique is becoming more known over the last years, there is also demand coming from European countries. Now, we are preparing ourselves for a project in Italy for a very well-known energy company about slim hole drilling for exploration of geothermal reservoirs," said Ahmet Topdemir, general manager of Ortadoğu.

Ortadoğu, which manufactures its own rigs through its sister company Geo Machinery, is honing its machinery engineering department with the help of Tübitak to find cheaper and more innovation solutions.

"We are working with Tübitak on three projects directly related with machine design and building. We are looking for different sources aside from gasoline because



Han İlhan, president and CEO, Aldridge Minerals.

gasoline prices are very high and directly affect our costs in drilling. To present our customers with good prices we need to decrease our operating cost. We are designing an electricity motor machine which is a new project for subsurface work for the Çayeli Copper Mine of First Quantum Minerals," said Topdemir.

Turkish contractors bring expertise to mining capital execution

As the Turkish mining industry continues to grow, local engineering expertise is evolving to meet increasingly sophisticated needs.

Promer Consultancy Engineering, which specializes in detail engineering, has developed its practice through working in industrial design for Turkey's gold producers, such as Koza, Eldorado and Alacer.

"Turkey's engineering industry does not have strong international experience in basic design ability, so for the past two years we have developed relationships with firms in the international market to support us with basic design. We now have a relationship with Jacobs Engineering, a company with extensive global experience across a range of markets. Jacobs is supplying processing engineering and we are supplying all detail engineering, as well as local market availabilities and local engineering supplies as we develop projects in Turkey," said Yüksel Tonguç, general manager of Promer Consultancy Engineering.

While international companies often opt to import their support services, the cost savings that come from using Turkish expertise are unparalleled.

"International investors do not know enough about local market availabilities. Most think that Turkey does not have much industry and they prefer to make their investments using technical support from North America and Europe. With this, they are losing at the beginning because they are

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calculating in high price investment values. Generally construction and erection is only 40-45% of your investment, while another 50% is equipment. You should know the market very well to know which critical equipment should be imported and what can be procured from the local market," said Tonguç of Promer.

Bringing in international experts as partners is a model that has served well. Together with US-based Kappes Cassiday & Associates (KCA), Turkish engineering firm DAMA Engineering is doing technological studies at KCA laboratories as well as EPCM work for gold projects. "In that regard, we have completed one project in full in Turkey, which is an agitated tank leach operation of high grade gold/silver with a 200 mt/d capacity running for the last two years. We are about to complete another project near Konya, Turkey," said Sabri Karahan, general manager of DAMA Engineering.

When it comes to the actual operation of mines, Turkey's strong construction and engineering experience again comes to the rescue to introduce cost savings through the use of subcontractors. Çiftay Construction, Commissioning and Trade has served the mining market for over 50 years, starting with aggregate mining and moving into coal, iron ore and gold in recent years. Çiftay contributes annually to the production of almost 52% of the iron ore produced in Turkey through contracting for Erdemir. Among its other operations, Çiftay has handled 35 million mt of earth works for Alacer's Çöpler mine to date, in addition to carrying out underground mining at Koza's Mastra mine and now VTG Holding's Çalda nickel mine producing 200,000 mt of nickel.

"Foreign investors want to make minimum investments and so do not want to invest in equipment, which yields higher costs," said Gülant Candaş, general manager of Çiftay.



Gülant Candaş, general manager, Çiftay.



İlker Tan, general manager, Martin Engineering Turkey.

A contractor approach can cut costs in labor and fuel. "When considering the costs of fuel, which are high in Turkey, and the low cost of labor, it is an advantage to use a smaller equipment fleet. When you reduce the size of equipment the labor force increases automatically, which is why foreign investors want to work with contractors who can manage their increasing labor force. With smaller equipment, your initial investment costs are much lower. The other important benefit is that we are able to supply jobs for local people, which brings more benefits to the communities," said Candaş.

Equipment supply: Seeking cost-control and innovation in the down-cycle

As more suppliers move in, and Turkish distributors acquire more global brands, cost and quality competition has grown fierce, making innovation and after-sales services key points of differentiation.

Martin Engineering Turkey, a US-based supplier of bulk material handling solutions, is relying on its innovative approach to safety to maintain its edge. "In Turkey we are implementing an innovation that is called 'Walking the Belt,' a full technical evaluation process of the customer's conveyor systems that we carry out through a routine inspection program for conveyor maintenance, providing regularly scheduled reviews of the components. While the systems run, you cannot fix them, but you can observe what is not working properly. Then, when there is a maintenance shut down, you know directly what to do," said İlker Tan, general manager of Martin Engineering Turkey.

"We will continue to perform this service at site by a tablet which is supported by a special software program. By using this technology, we will be performing the program more effectively, faster and safer," said Tan.

Further along on the innovation front, information technology and software solutions

are playing a more crucial role in Turkey as miners learn to take better advantage of information systems. Almina Minerals was established in late 2011 as a specialist consulting and engineering firm exclusively distributing for Geovia, formally Gemcom, to provide geology, mine planning and operational performance management. As of 2014, Almina is the also exclusive distributor in Turkey for LIM, which specializes in software for geological measuring instrumentation.

"LIM's main mining business areas are in foundation, geo-technics, hydrogeology, mines and quarries, underground workings and related software. Our ambition is to be able to propose to our clients a complete measurement solution for boreholes, comprising both instrumentation for acquisition during drilling and logging in the resulting borehole, as well as for foundations and special structures," said Arar of Almina Minerals.

The persistent challenge for service providers when it comes to innovative technologies is in educating the market. For MineRP, a global software company and consultancy based out of South Africa, bringing its proprietary mine design and planning system Mine 2-4D for both underground and surface mining to Turkey, on the job training for clients is a necessary service offer for companies bringing new products to the market.

"We have given the opportunity to our clients to send their mining engineers to Canada and South Africa to train on our international projects. These young engineers were able to take geostatistics and mine planning courses at our regional offices. We are keen to support our clients not only in completion of their engineering projects, but also in professional education and coaching," said Sermet İlhan, general manager of MineRP Eurasia.

As more innovation comes into the market, both from international mining experts and from locally-grown R&D, Turkey is propelled further along the path to the premier league of mining countries. Turkey's geological potential is undoubtedly promising, yet the country's future as a world-class mining jurisdiction will rely heavily on its government's abilities to improve its practices of regulatory implementation. With democratic elections underway and growing industry associations lobbying for miners' interests, the industry has a bright outlook for policy improvements. As the global mining markets pick up in the latter half of 2014 and the start of 2015, more free flowing capital will find its way to the Turkish market provided its retains its investor-friendly stance.

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