Development of Coking Coal in Inland Mozambique

Coal Mining Development in Mozambique by Japanese Companies

Coal is still an important energy resource, and its demand is growing in developing countries such as China and India, making it increasingly difficult to secure a stable supply of coal. Japan is developing new sources around the world, and Mozambique in Africa is one of the promising areas for coal production in the future.

A 5-year coal industry development plan has started in Mozambique in 2012, led by the Japanese government, and JOGMEC is currently in charge of the following operations:

1. Geographical survey:
   JOGMEC is working together with the government of Mozambique in the provinces of Niassa and Manica, which show great promises for coal reserves. From 2013 it moves to full-scale surveys, such as boring.

2. A coal industry master plan for future coal use:
   JOGMEC is carrying out surveys on needs and potentials of coal-related industries in the coal production areas, and from 2013 we plan to formulate a master plan and an implementation plan.

Since especially Mozambique has a plenty of reserves for hard coking coal which is essential to produce steel and which global reserves are quite limited, Nippon Steel & Sumitomo Metal Corporation and Nippon Steel Trading Company have been engaged in a coal development project (the Revuboe Project) in this country from the beginning, and JOGMEC is providing the project with supports in order to secure a stable supply of coal for Japan in the future.

Unlike oil and natural gas, which can be transported over land by pipelines, rail systems are important for transportation of coal. Coal transportation also requires ports which are capable of accommodating large ships. Coal development should move forward with that of infrastructure of the nation and therefore it is a process to contribute to the nation building itself of Mozambique.

Africa Promises High Potential for Coal as Well

According to WEC, as of the end of 2008, proved recoverable coal reserves in an entire Africa are 31.7 billion tons, which accounts for just 3.7% of the world’s reserves (including lignite). And most of them are located in South Africa. But it is possible that this is due to insufficient surveys outside of South Africa, and that there will be many discoveries of coal reserves in surrounding countries in the future.

In the southeast area of Africa, as a result of recent surveys, approximately 20 billion tons of coal resources have been reported in Tete Province, Mozambique (Clean Coal Symposium, 2011, Tokyo). In Botswana as well, 3.3 billion tons of measured coal resources have been confirmed (Mcleod Coal Exports Conference 2009). There is a high expectation for the discovery of abundant resources in Zimbabwe, Tanzania, and Madagascar, too. JOGMEC is going to proceed with development projects which contribute to securing a stable supply of coal for Japan, and deepen strong relationships between Japan and the countries of Africa.
The eyes of the resource development industry are turning to Africa. The African continent has long been considered rich in potential energy and metal resources. However, most of its countries have been plagued by civil wars and political instability since gaining independence, and infrastructure development lags. This has prevented full-fledged resource development in all but a handful of locations.

In recent years, however, this situation has begun changing dramatically. Wars have ended, and the number of countries which wish to grow economically by leveraging their resources has increased.

One of the early supporters of these moves by African countries has been Japan. TICAD (the Tokyo International Conference on African Development) will be held in Yokohama from June 1 to 3. This will be the fifth session of the conference, which began in 1998, and is held jointly by organizations such as the United Nations, the United Nations Development Program (UNDP), and the World Bank. What sets TICAD apart the most is that it does not restrict itself to more economic aid, but instead is focused on eliminating poverty in Africa and expanding its interaction with the rest of the world economy. It has emphasized the need for economic development to be accompanied by societal development, such as education, health and hygiene, and support for the impoverished. This is involved in many resource development projects in Africa, holds this philosophy in high regard, and has striven to create economic development businesses which are beneficial to both resource-rich countries and Japan.

As surveys of wide expanses of Africa have progressed, they have found that the continent’s resource potential far greater than originally believed. Deposits of oil, natural gas, coal, and metal resources including rare metals have been discovered. Many geological structures potentially rich in these resources have also been identified.

This special edition focuses on the latest information about resources in the constantly changing African continent.

Africa, Land of Natural Resources: The Whole Picture
Exploring the Potential of Its Energy and Metal Resources
The Giant Gas Field in Mozambique
Whose Discovery Started the World

The following areas have been widely known as Africa’s main energy resource supplying areas.
1) Countries bordering the Mediterranean Sea in northern Africa (Libya, Algeria, Egypt, etc.)
2) Countries bordering the Gulf of Guinea (Nigeria, Gabon, Republic of the Congo, Equatorial Guinea, etc.)
3) Southwestern Africa (Angola, etc.)
4) Inland northern Africa (South Sudan, Sudan, Chad, etc.)

However, in recent years large oil and gas fields have been discovered in areas where there was almost no production in the past. And also potentially resource-rich geological structures have been discovered. These discoveries are poised to make major changes to the energy situation.

One of the watched new areas for which there is high expectation is the massive gas field discovered in the deep water area off the coast of Mozambique. Mozambique is situated in the southeast of Africa, and has a long coastline bordering the Indian Ocean. Multiple gas strata have been discovered in the sea to the north, near Tanzania. Only in the two existing exploration sites, reserves are expected to exceed 100 trillion cubic feet (Tcf). Further development in adjacent areas may turn these areas into the biggest natural gas supplying ones in the world.

Japan’s Mitsui & Co. has entered into natural gas development in Mozambique, and the area is expected to become one of the most important energy resources in Japan from 2018, when the project plans for LNG production to begin.

JOGMEC has also provided a variety of support, one example of which is described below.

JOGMEC’s Mozambique Training Operations
Training Operations Strengthening the Relationship between Japan and the Gas Producing Countries in Mozambique with the Support of the Rich VIN

JOGMEC’s training operations are important tools. They not only broaden and deepen JOGMEC’s connections, but also enrich and expand the infrastructure of human resources with oil producing nations, such as their engineering and management — a win-win situation. In Mozambique, which discovered an unexpectedly large gas field, a bilateral agreement has been signed, which includes the acceptance of LNG technicians.

The number of trainees from Mozambique has now reached 28. Over the past 25 years, JOGMEC has provided training to 2,736 technical personnel from 46 countries, including Mozambique.

We will continue to enhance and expand our training activities in order to cultivate human resources in oil-producing countries, which will be able to contribute to a stable supply of resources to Japan in the future.

View of the Geology Survey area from the Eastern Rift valley fault scarp

Africa, Land of Natural Resources: The Whole Picture Exploring the Potential of its Energy and Metal Resources

Oil Natural Gas
Oil Gas Production Maps Are Being Redrawn with the Discovery of New Hot Areas

Great Rift Valley of Eastern Africa
In spring of 2012, the British oil development company Tullow Oil succeeded at exploratory oil drilling in the Turkana District in northwestern Kenya. This was an accomplishment for Kenya, which had not previously been an oil producer, and drew attention to this new development area, following Mozambique.

Nearby, South Sudan (which became independent from Sudan in July, 2011), located to the north, is another area rich in oil, but Kenya’s geological structure is completely different from South Sudan’s one. Kenya is crossed by the Great Rift Valley, which runs north-south, dividing the east of Africa. The Great Rift Valley was formed between around 5 and 10 million years ago relatively recently in geological terms. In Africa, oil has generally been found in much older strata, so it wasn’t expected to be present in strata this new.

However, thick lake deposits were found in Uganda, in the Western Rift Valley, as well as source rock, which generates oil, and sandstone, which forms reservoirs. From 2005 onwards multiple oil fields were discovered. This was the first discovery of oil field in Kenya, located in the Eastern Rift Valley, and it is expected to result in an increase in development activities.

JOGMEC’s Geological Survey Operations in Kenya
In April, 2012, JOGMEC signed a joint petroleum exploration agreement with the National Oil Corporation of Kenya (NOCK). We are currently engaged in a joint geological survey project in Kenya, and it will make a difference.

The Growing African Atlantic Oil Gas Field Zone
On the Atlantic coast, countries such as Nigeria, Equatorial Guinea, and Gabon, located at the deepest parts of the Gulf of Guinea, have been oil producing countries, but production has rapidly risen in Angola, to the south, which has been engaged in deep sea oil field development. It is now the second largest producer of oil in Africa, following Nigeria. The Angola area split from what is now the south of Brazil when the African and South American continents separated, between the Jurassic and the early Cretaceous periods. Development is underway in Brazil of oil gas beds under the deep sea bedded salt called ‘pre-salt’. Brazil now has the 14th largest amount of oil reserves in the world. The coast of Angola, then, which shares the same geological structure, has great potential for increased oil production if pre-salt development continues in the future.

In the area from the Gulf of Guinea to the west, as well, new large-scale gas fields have been discovered in the deep sea off the coast of Ghana, leading to the construction of mining sites in the Ivory Coast, Liberia, and Sierra Leone, to the west, and exploration and development are underway.

Relationships between Petroleum Systems (source rock, reservoir rock, and accumulation environments, and ages) of South America and Western Africa

JOGMEC’s Investments in Africa
JOGMEC invests in exploration business by Japanese companies in Mozambique, as well as Ghana, the Democratic Republic of the Congo, Gabon, and Namibia. If these projects are successful, it will definitely contribute to a stable supply of energy to Japan through supply source diversification, as well as further strengthening Japan’s ties with these companies.

The Shale Gas Revolution Beginning in Northern Africa
In addition to these sub-Saharan developments, there have also been new developments in the oil gas producing countries of northern Africa.

In the past, the energy resources produced by these countries have been carried to Europe via pipelines crossing the Mediterranean Sea. However, since shale gas development is beginning in and around Libya, and production levels are getting rising, so these areas will get a lot of attention as a new future supply ones for Japan.
[Metal Resources]

Multiple New Discoveries of Platinum, Rare Earth, and Other Deposits

Africa, Land of Natural Resources: The Whole Picture Exploring the Potential of its Energy and Metal Resources

The Southern African countries, the vast area extending from the Democratic Republic of the Congo to Republic of South Africa, are well known region of its huge potential of metals resources; however actual development was less progressed compared to its potential due to civil wars, governmental instability and so on. As improving investment climate, a variety of exploration/mining projects are gradually increasing these decades. This section will introduce some of the JOGMEC activities regarding metals Exploration in the Southern African countries.

Establishment of the Botswana Geologic Remote Sensing Center

In July, 2008, JOGMEC established the Botswana Geological Remote Sensing Center in Lobatse, Botswana.

Remote sensing is one of the regional geoscientific approaches based upon geological data acquired by satellites and/or aircraft-borne sensors. It is one of the fields that Japanese geoscientists have an advantage with an extensive experience. The goal of the Botswana remote sensing center is to carry out geological analysis in entire Southern African countries, cooperating with the Government technical staff of Southern African Development Community (SADC) countries. In order to achieve this, JOGMEC is providing training opportunities on geologic remote sensing and transferring analytical skill of data manipulation and image interpretation. In addition to this, site verification (groundtruth) and target definition are also jointly performed for the sake of further activating mineral exploration.

Locations of JOGMEC’s platinum metal exploration projects

Waterberg Plateau

JOGMEC is conducting platinum targeting exploration project in Republic of South Africa with our JV partner, Platinum Group Metals Limited (PTM). Platinum metal is an extremely important for the use of an exhaustion cleaning catalysts for car industries. Platinum metals have been primarily mined in Republic of South Africa of which amount accounts for nearly three-quarters of the world’s platinum production. JOGMEC started a grass-roots exploration project, “Waterberg” located in the north end of the Bushveld Complex in 2009. The ground surface of the area entirely consists of dense covered material over Bushveld, so none has done mineral exploration ever. JOGMEC and Canadian partner PTM introduced regional ground magnetic/gravity surveys and then conducted scout drillings. In January 2012, the third hole intersected new mineralized reefs at depth. That was a discovery of the Waterberg deposit. Following massive drilling campaign is revealing the nature of these new reefs and real value of the Waterberg project. Latest press release in 2013 reported approximately 315 tons of 2Pt+1Au metals in the inferred category. Drilling program is still ongoing in 2013.

Expectation of Stable Supply of Rare Earth Elements (REE)

The last example is the rare earth element exploration being performed in Malawi. Rare earth elements, one of the rare metals, are used in many of hi-tech industries, i.e. as additives of quality magnets, fluorescent light tubes, abrasive powder and so on. One of the concerns is that the world production of REE is mostly dominated by just one country and its export is strictly regulated under politics. JOGMEC’s goal is to create new resource supply through the exploratory work and resultant development. Malawi is one of the countries where JOGMEC has its keen interest.

Southern African countries are viewed as extremely promising area for various metals resources, especially of platinum metals and REE that could be concentrated only in a handful of countries. Sovereign risks may have hindered resource investment of Japanese investors; however JOGMEC is proceeding a package of activities of Botswana Geologic Remote Sensing Center and various exploration programs to create new resource values in SADC countries.