

ArcelorMittal Investment Program Non-Technical Summary

1. INTRODUCTION

Public Joint Stock Company ArcelorMittal Kriviy Rih (AMKR, the Company) owns an integrated steel plant with associated underground and open pit iron ore mines located in Kriviy Rih, Central Ukraine. AMKR is part of the ArcelorMittal Group, the world's leading steel company. ArcelorMittal Group is the leader in major global steel markets, including automotive, construction, household appliances and packaging. The Group also owns large raw material stocks and effective system of sales. ArcelorMittal Group with the workforce of more than two hundred thousand employees has representations in more than 60 countries all over the world.

AMKR is one of the leaders among the largest enterprises of Mining and Steel Complex of Ukraine. AMKR specializes in long products – rebar and wire rod from ordinary and light alloyed steels, as well as sinter, concentrate, coke, pig iron, steel, section and shape rolled products. Activity of AMKR covers production chain from iron ore mining up to finished metal products. In 2015 the Company produced 5.5 million tons of pig iron, 6.3 million tons of steel and 5.3 million tons of rolled products.

The history of the steel plant and the mines originate back to 1930's, as a Government owned facility, when production of cast iron was commenced. The Company was one of the largest integrated steel plants in the former Soviet Union and at its peak producing 17 million tons of steel per annum. Through the years the facility has gradually developed to current state of integrated plant, where all metallurgical and other processes necessary to manufacture steel and steel products are conducted. Currently the production capacity amounts to almost 6.4 million tons of steel per annum and ore extraction exceeding 23 million tons per annum.

The Company has embarked on a modernization program as part of the commitment to meet obligations from the Sale and Purchase Agreement (SPA) and amendments to it and production needs, but most importantly to meet its corporate sustainability goals and reduce its overall environmental footprint.

This non-technical summary presents the part of the investment program financed by EBRD along with the environmental and social benefits which are expected to be achieved.

2. WHAT DOES “INTEGRATED STEEL PLANT” MEAN?

Production of steel is a complicated process which utilizes a lot of energy and raw materials, of which the most important are iron ore and coke. Steel is known since the “steel age” but its production nowadays is significantly different than in ancient times and the quality of steel is incomparably better now than even in the late 20th century.

Nowadays there are 4 different methods of steel production as shown on Figure 1, of which the most commonly used is the method based on blast furnace and basic oxygen furnace method, which is also used at AMKR facility.

It is not necessary for all the consecutive steps of steel production in this method to be conducted at one site, e.g. production of cast iron or coke can be done separately from the steel production, however, gathering all technological steps, from coke production to final steel making at one site allows for effective use of by-products of different processes and optimize energy consumption. Such plants at which all technological processes, from ore preparation and coke production to manufacturing of final products of steel are called “integrated steel plants”.

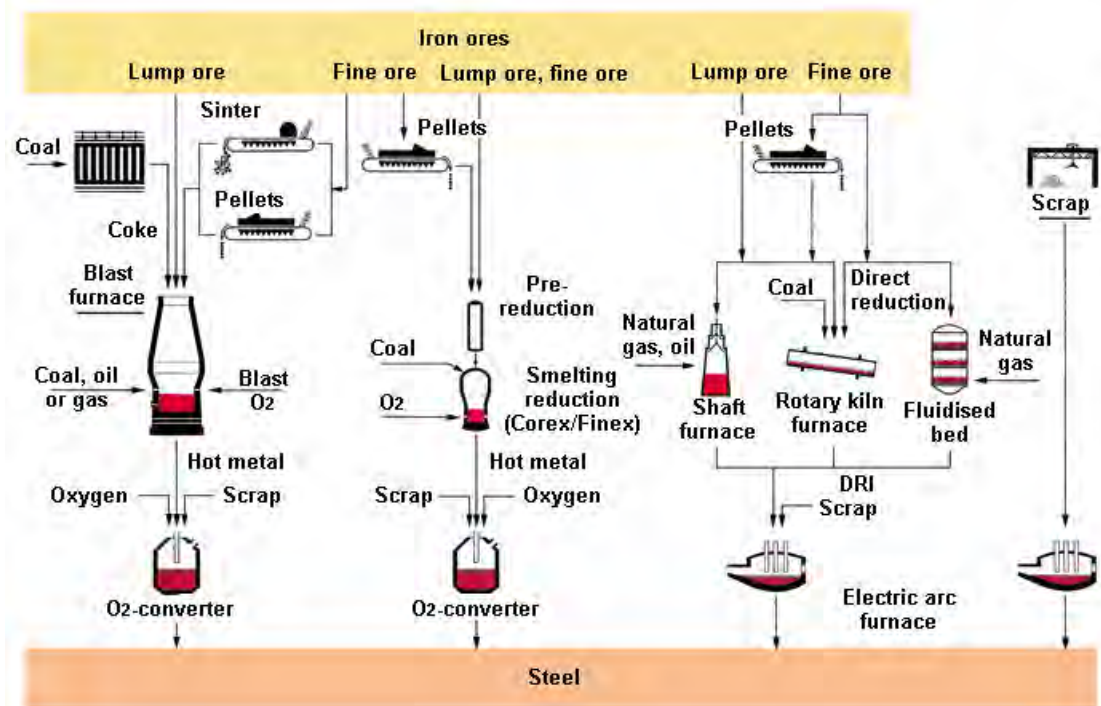


Figure 1. Crude steel production methods (source: BREF for Iron and Steel Production, 2010)

3. WHAT ARE THE STEPS OF STEEL MAKING IN AMKR?

The AMKR facility uses the classic blast furnace/basic oxygen furnace route of steel production. The most obvious difference between this and most of the others integrated steel plants is that at the AMKR facility iron ore excavated at own mines is used. Below, a short description of the production process is provided.

3.1 Iron ore excavation and primary preparation

AMKR facility exploits their own iron ore deposits located in Krivyi Rih. Ore is excavated in open pit and deep mines with use of explosives (in open pit mines) and drilling methods. Ore deposits include both oxidized and non-oxidized ores, only non-oxidized is used for steel production, the oxidized ore is stored in temporary storage sites/facilities.

Non-oxidized ore is transported to beneficiation plants, where it is crushed, diluted in water and then iron parts are separated from tailings with use of electromagnetic method. Such operation allows to increase the iron content in ore to approximately 60-70% which makes the further production more effective. The residuals of the beneficiation as well as of mining process are stored in tailing ponds.



Figure 2. Iron ore open pit mine

3.2 Coke production

Coke is necessary for iron production as a chemical reagent (reducing agent) and partly as a fuel. Coke is produced from coking coal in so-called coking batteries. The coking battery is a set of ovens which are charged with coal and then heated without access to ambient air (i.e. oxygen) until all gases and water present in coal are fully evaporated. These high-calorific gases, called "coke oven gas" or COG, are captured and after treatment used for coke battery heating and for use in other installations. Treatment of COG includes among others removal of tar, sulphur compounds and other substances which are by-products of a commercial value.

After completion of coal degasification the ready coke is pushed out of the ovens and quenched – at the AMKR facility with use of water.



Figure 3. Coke oven battery at AMKR site

3.3 Sinter production

The modern blast furnaces (BF) need the charge to be provided in special form, usually as a sinter or pellets made of coke, iron ore, iron-bearing residues and other additives if needed. At the AMKR facility the BFs are charged with sinter.

The raw materials are blended and then directed to the moving grate, where the coke present in the mixture is ignited by gas burners. Natural gas is used. As the grate continues to move, the burning coke reaches the temperature sufficient to create porous material referred to as a sinter. Further, the sinter is cooled by a strong blow of air and crushed and screened to separate small particles which are then returned to the process.



Figure 4. Sinter strand

3.4 Blast Furnace

A blast furnace is a closed system in which sinter or other iron-bearing material, additives, such as e.g. limestone and reducing agent, i.e. coke are continuously fed from the top through a charging system that prevents escape of blast furnace gas (BF gas). A hot air blast enriched with oxygen and auxiliary reducing agents is injected to the furnace, where reacts with the reducing agents and creates carbon monoxide which further reduces iron oxides to metal iron. Hot metal, so called pig iron, of a high content of iron is discharged from the furnace on regular basis in a cast house, and then directed for further metallurgical processes. The slag generated during the process is collected and stored out of the main site. BF gas after treatment, having high content of CO is used as energy source in various locations, such as hot blast stoves or blast furnaces, rolling mills, power plants etc.



Figure 5. Blast furnace #9 at AMKR site

3.5 Steel production and casting

Pig iron produced in BF's contains more than 2% of carbon and requires further treatment in order to produce steel (which is defined as alloy of carbon and iron with carbon below 2%). Therefore, the next technological process is further reduction of carbon content.

The modern techniques applied are basic oxygen furnaces (BOF), in which the pig iron is mixed with metal scraps and other additives and then oxygen is blown into the converter through water-cooled lance. Introduction of oxygen causes oxidation of carbon as well as other metal impurities which gather in a slag or are exhausted with the off-gases. The process is semi-continuous. After achieving the required quality, produced steel is tapped for casting, which can be either continuous (i.e. the casting is conducted continuously in a casting machine which enables the casting of one or a sequence of ladles of liquid steel into a continuous strand of billet, bloom, slab, beam blank or strip), or ingot. At the site continuous casting is conducted for steel made in BOFs.

AMKR facility also uses old technology for production of steel in a Twin Hearth Furnace (THF). This process is a batch process, in which the reactor is filled with light scraps, then heated with use of gas until the charge is melted, then heavy scraps and pig iron as well as other additives are added. The oxygen in iron oxide and other impurities decarburize the pig iron by burning excess carbon away, forming steel. To increase the oxygen contents of the heat, iron ore can be added to the reactor. While the quality parameters are achieved, the steel is tapped for ingot casting.

4. WHAT IS THE CURRENT ENVIRONMENTAL SITUATION?

As any other integrated steel plant around the world the AMKR facility impacts the environment, in particular by air emissions. Numerous processes conducted at the site involve transport and processing of dusty materials and incineration of fuels.

The processes that generate high emission of dust include:

- Coal transport, charging of COBs;
- Coke pushing from COBs, quenching, screening and transport;
- Preparation of charge for sintering and sintering - in particular during sinter cooling and crushing;
- Preparation of charge for BF's, pig iron casting;
- Charging of BOFs and casting.

Such processes are to some extent controlled by application of gas capture systems (GCS) equipped with emission controls, such as bag filters or electrostatic precipitations, but their efficiency depends on the age of installations and technical status of the devices.

The site emissions are related to coking and incineration of COG, BFG and BOF gas. Gaseous emissions from coking occur from leaky doors and valves of the COBs and the major measure for reduction is proper maintenance of the devices. Gases generated in COBs and BF's are collected and purified from impurities: COG at the gas treatment shop which substantially reduces content of tar and sulphur compounds, the BFG is dedusted. Incineration of gases is a source of emission of NO_x and SO₂ as well as CO₂. Emission of CO₂ is one of major concerns in ArcelorMittal Group, however, no effective technical measures to reduce such emission in the classical steel plants are currently known. Optimization at the AMKR site of CO₂ emission is achieved by use of COG and BFG as fuel at the site, i.e. CO₂ is generated during energy recovery. So far the BOF gas is not used that way and is incinerated in the stack flares in order to avoid CO emission.

The investment program of AMKR that involved UAH 4.5 billion was commenced in 2007 and has resulted in significant reduction of overall environmental footprint of the plant, as shown at Figure 6.

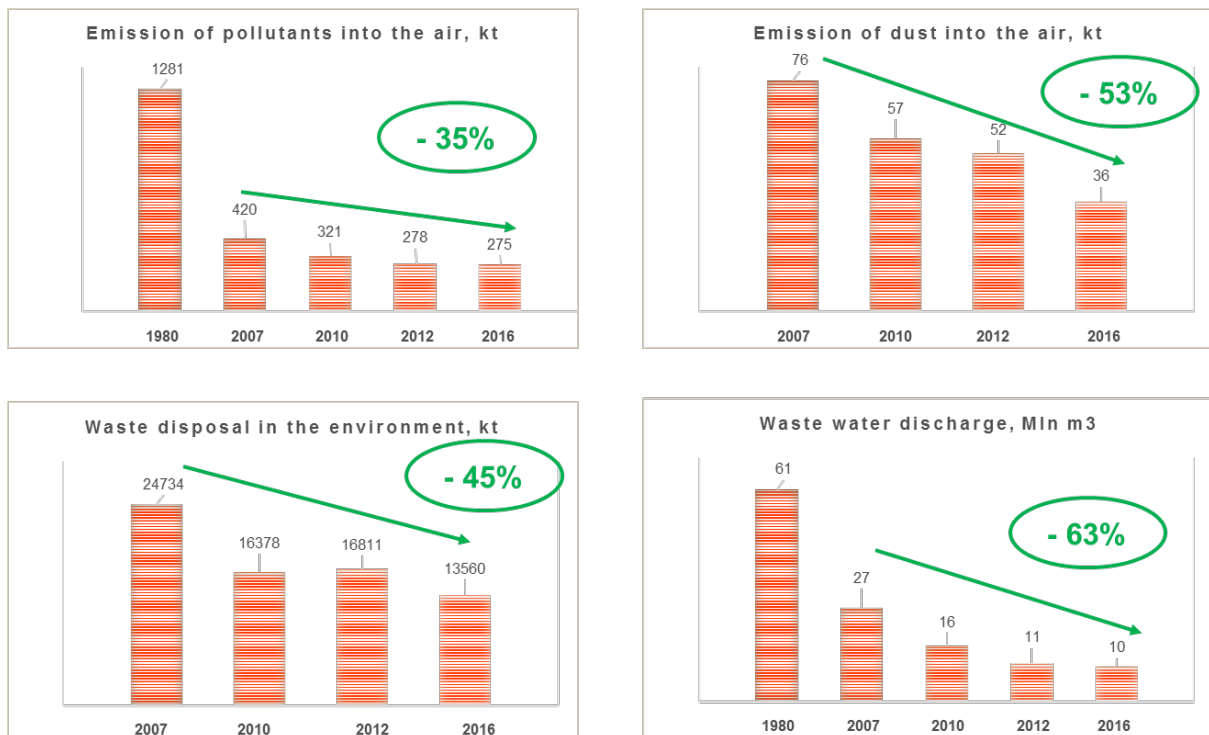


Figure 6. Environmental results of the AMKR investment program since 2007

It must be noted that AMKR's current operations do not cause breaches of any permitted environmental impacts. Further, the Company conducts monitoring of air quality at 3 control points situated in a sanitary zone around the plant. The results of air quality measurements are updated on daily basis and are presented on the information board (once a day); city administration and SSFSCP (State Service for Food Safety and Consumer Protection) (on monthly basis), DRSA (Dnipropetrovsk regional state administration) (each 10 days) and State Environmental Inspection(quarterly). The results are also presented on the AMKR website (<https://ukraine.arcelormittal.com/index.php?id=334>).

5. WHAT WILL BE FINANCED IN SHORT TERM?

Although AMKR's investment program for the following years is very extensive, a priority program has been developed and agreed to address key EHS issues. The program includes 4 investments as presented below.

5.1 New sinter plant

Currently, there are three sinter plants (SP) in operation: SP 1, SP 2 and Metallurgical SP (historical name) with 17 sinter strands. These SPs are old and AMKR is challenged to meet the existing environmental standards and are unlikely to meet the new proposed standards which will be implemented in Ukraine from 01/01/2021. In order to secure sufficient sinter production for the years to come, the Company considered modernization of the SPs but due to the safety risks and the expected costs and the technical constraints this option has been reconsidered. Instead, the plan is to install a completely new sinter plant with a total capacity of 10 million tons per annum. The new sinter plant is proposed to have modern technological solutions and be equipped with

proportioning system, mixing/nodulizing circuit, 2 sinter machines with ignition furnaces, sinter crushing and screening circuit, process gas system, dedusting system, electrics/automation, sinter storage (16 Hrs), sinter dispatch system to BF-9, sinter dispatch system to BF Shop-1, coke and flux crushing and screening circuit as well as conveyors. The project is currently at the stage of designing and its implementation is planned for the years 2018-2022, subject to certain conditions. After full implementation of the project, SP 1 and MSP will be shut down. Capacity of the SP 2 will be reduced by at least 50%, this SP is planned to cover the difference between capacity of the new SP and the facility demand, which is expected to reach 10.5 million tons per annum in 2020.

5.2 Full reline of BF 9

Pig iron at the site is produced by 4 BFs, of which BF 9 has the largest production capacity which amounts 50% of the total facility demand. The last major repair of this BF was completed in 2003 and no major modernizations nor improvements has been done at this BF since then. A detailed health study of the furnace was conducted in November 2016, which showed that the shell steel structures are in a limited operational condition. Also, the auxiliary structures in the BF9 complex also needs to be reconstructed in order to properly support BF9 in the next camping life.

The scope of this project includes among others implementation of a new cooling system, improvement of refractories and re-construction of the shell, significant and most up-to-date equipment of the cast house, replacement of the bustle pipes and furnace top, improvements in gas cleaning system (more effective dedusting for cast house and bunker stock house).

The construction phase of the project is planned for the years 2018 (second half) – 2020.

5.3 Replacement of the blowers for BF 9

The blast for the BF 9 is produced by steam driven blowers at heat and power plant No. 3. The blowers were constructed in 1970's and, by today's standards are highly ineffective from an energy use perspective. The company intends to replace the old blowers with the new, electric ones, which will allow for reduction of gas consumption and more effective energy use.

The blowers will be replaced in two phases: the 1st one will be replaced before the relined BF 9 is fully operational, the second one will be replaced in 2021-2022.

5.4 Ladle furnace and continuous casting

Apart of considerable air emissions, since most of AMKR's products are still produced via old fashioned Ingot casting route, quality of the steel produced there is insufficient to meet the clients' expectations. As a measure for improvement, the company intends to improve converters No. 1, 2 and 3 to achieve future environmental standards and resign from ingot casting for the favour of continuous casting.

6. WILL THE PROJECT MEET THE NATIONAL AND INTERNATIONAL STANDARDS?

All projects to be financed directly by EBRD are structured to meet the current and perspective national environmental legislation. After project implementation, the environmental performance of the subject investments will be improved as compared to the current status, since the new national standards introduce more strict environmental constraints with respect to air emissions. The projects will be prepared and executed in line with the Ukrainian regulations with respect to assessment of environmental impacts, i.e. in line with currently binding rules by December 18, 2017, and in line with newly adopted Ukrainian EIA Law.

In line with corporate standards the investment program is also structured to meet the EU environmental standards as far as practicable and economically justified. In particular, the individual projects are planned to adopt the best industry practice as codified under the Best Available Techniques (BAT) Conclusions 2012 for Iron and Steel, adopted by the European Commission. Some investments to attain BAT compliance will be undertaken between 2020-23 and 2023-26. As part of the investment the Company will install CEMS (Continuous Emission Monitoring System) to allow for the optimization of processes and ensure more detailed environmental monitoring. Given below are some of the key investments planned

- For augmentation of the sinter plant:
 - Dust emission according to BAT shall not exceed 15 or 40 mg/Nm³ (depending on emission control installed).
- For BF 9:
 - Emission of dust from cast house should not exceed 15 mg/Nm³ (daily average) or 15 mg/t of hot metal according to BAT, but the design assumes emission of 50 mg/Nm³ (during dust generation).

According to EBRD Environmental and Social Policy (2014), the projects which fall under the EU IED directive - and this is the case – shall meet, regardless geographical location, the provisions of the directive, i.e. also meet the BAT requirements. Given the large investment needs of the company and limited time for project implementation, the EBRD has applied for a derogation from its usual policy position in relation to meeting of BAT, which means that the individual projects shall meet the BAT requirements in the future, after 2023, i.e. shall be designed in the way allowing full adaptation to BAT requirements at the later stage. Further, EBRD's also requests the Company to undertake an independent BAT assessment of the projects and the EIA procedure following EU standards as per EIA directive. Moreover, the actions necessary to achieve full compliance with EBRD's requirements as per its Environmental and Social Policy (2014) are summarized in the Environmental and Social Action Plan (ESAP).

7. WHAT ARE THE BENEFITS OF THE PROJECT FINANCED BY EBRD?

The investments financed by EBRD at AMKR facility will first of all improve operational performance of the plant and secure undisturbed and safe production of high-quality products. But thanks to these investments also natural environment and society of Kriviyi Rih and surrounding villages will benefit.

Although the facility invested 4.5 billion UAH in the period 2007-2016 which resulted with overall decrease environmental footprint (see Figure 6), thanks to the implementation of the investment program further reduction of emissions is expected, as presented on Figure 7. The planned investments will implement modern technologies used in well developed countries, although some room for improvement will still exist, as indicated in section 5. One way or the other, the planned investments will significantly contribute to the Company's plans for further reduction of air emission by 2021, when the total emission of air pollutants should not exceed 209 thousand tons per annum, which corresponds to 32.7 kg/t of steel versus current 43.9 kg/t of steel.

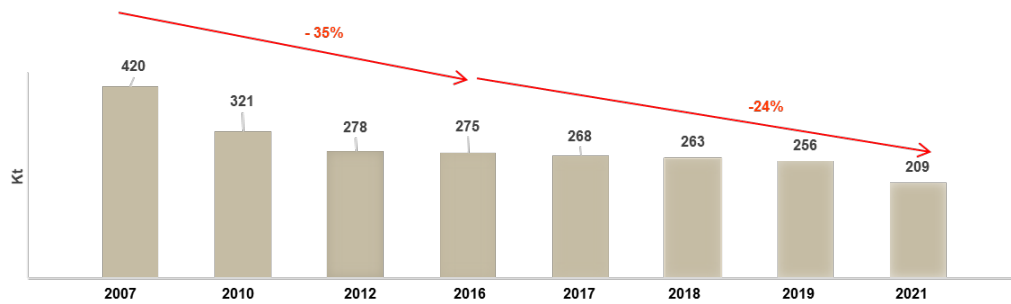


Figure 7. Forecast of expected overall emission from AMKR facility

Particular investments will create the following environmental benefits:

- Sinter plant:
 - reduction of emissions' volume via shutdown of worn out SPM & SP1 & partly SP2, and also reduction of average value of emissions per 1 ton of sinter via implementation of:
 - automatic control system of environmental monitoring;
 - intensive mixture with control of charge moisture;
 - plant dedusting;
 - modern GCP (electric filters & bag filters);
 - recovering of exhaust sinter gases
- BF 9:
 - reduction of dust emission from charge preparation and casting by application of gas capture systems and installation of effective dedusters
 - reduction of sulphur containing compounds emission by approximately 30%
- Replacement of blowers:
 - Reduction of air emissions from heat and power plant due to reduced need for steam.
- New ladle furnace and continuous casting:
 - reduction of emissions volume via shut-down of old THF

The project will be executed entirely on the premises of AMKR and will not affect in any way protected areas. Further, due to overall reduction of air emission from the facility the quality of ambient air in Krivyi Rih is expected to improve, which will be monitored by AMKR with use of the existing air monitoring stations.

8. HOW WILL THE PROJECT BE MONITORED?

The investment program of the Company will be monitored on regular basis, both in terms of its implementation and of the environmental benefits achieved.

The Company is obliged by the loan contract to develop a set of key performance indicators (KPI) in a way sufficient to control performance of the implemented investment program, in particular the part of it which is financed by EBRD. The KPIs will cover such aspects as energy use, air emissions, – all relative to production volumes. KPIs will be developed also for basic H&S statistics such as number of accidents and near misses, number of days off due to accidents at work etc. The Company will also monitor relations with the stakeholders, among others by monitoring of submitted grievances.

CEMSs installed at the modernized installations will allow for better control of actual emissions and for improved control of the operational performance. The results of reduced emissions (due to implementation of the investments) will be observed by continuation of the ambient air monitoring program.

The progress of the investment program implementation, KPIs and overall facility environmental and social performance will be reported to the lenders and will be disclosed to the public in the Sustainable development reports on annual basis. Further, the progress of the investment project will be discussed by AMKR with ArcelorMittal corporate executives and EBRD representatives at the meetings which will be held at least once a year during the lifetime of the program.

9. IS MORE DETAILED INFORMATION AVAILABLE?

AMKR, following the corporate standards has well developed system of communication with the stakeholders, including administration, societies, scientific institutions and others. For the purpose of this investment program and in order to fulfil requirements of EBRD a project-specific Stakeholders Engagement Plan ("SEP") has been developed. In line with the SEP information about the investment program will be available among others:

- On the company web-site: the Company will provide up-to-date Projects' information on its web-site <https://ukraine.arcelormittal.com>. It will also be possible for users to provide feedback or ask questions about the Projects via the web-site.
- The announcements on the forthcoming public meetings will be made one month in advance via local media and by use of bulletin boards located in Kryvyi Rih and the neighboring settlements.
- The general public and the workforce will be informed via media (incl. a corporate newspaper "Metallurg") of all relevant and important Projects' milestones and current activities with press releases with direct distribution and placement on the AMKR's website.

For more information please contact the Company:

- By calling one of the five 24/7 operating hot-lines:
 - Internal Communications (056) 499 28 88
 - Environment (056) 499 58 58
 - Health and Safety (056) 499 42 41
 - Fraud (056) 440 00 41
 - Security (056) 499 58 68

Any grievances can be submitted to the Company via its website or using the following email addresses:

Ukraine@arcelormittal.com;
AMKR.SECURITY.HOT.LINE@arcelormittal.com;
AMKR.Internal.Communications@arcelormittal.com.