

**Search for a Spanish Partner for a
Bilateral R&D Project (this document will be shared with potential Spanish
companies)**

Organization	
Date of Request:	As soon as possible (Deadline: 07 April 2022)
Company name:	National Research Centre (NRC), Cairo, Egypt and Ezz Steel (ES), Egypt
Contact person and title/ designation:	Dr. Abdallah Shaltout, Dr. Abdulkader maghraby
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Website:	http://www.nrc.sci , https://www.ezzsteel.com/

SECTION 1: Your Company Profile

(Please give brief / to the point explanations. For more explanation on any point below, you may add a short paragraph as an annexure, with this document.)

Business Sector	NRC: Research and Development ES: Steel production
Company mission or core functions	NRC: Research and Development ES: Steel production
Date of establishment	NRC: 1954 ES : 1994
Ownership (if public and traded, add stock exchange and ticker symbol)	NRC: Government of Egypt ES: Mr. Ahmed Ezz
Total number of employees	NRC: 3500 Research Staff ES: 500 (Menoufia factory)
Number of employees in R&D	NRC: 3500 Research Staff ES: 5-10 (Menoufia factory)
Key products sold or services provided	NRC: Consulting, Analysis, Research and Development ES: Sold Steel for public
Company core technical competences	NRC: Wastewater, Energy, pharmaceutical industry, Basic science, Chemical industry ES: producing high quality steel
Key R&D programs and activities	Energy, Water, Health Care, Artificial Intelligent, Agriculture, Strategic industry

Examples of accomplishments	In 2021: 3930 published papers, 147 patents, 45 international projects, 650 domestic projects
Company strategic orientation	NRC: Research and Development. ES: Steel production

SECTION 2: Partner of Interest

(Please provide a brief summary of the prospective partner company or organization. This summary may address some or all of the points below)

Profile of ideal technology partner	Steel companies; wastewater treatment companies
Core technological competencies and expertise	Elemental Analysis; wastewater treatment; spectroscopic characterization
Other essential qualifications (e.g.: ownership, track records etc.)	--
If you have a list of companies with whom you are in contact or interested in contacting, please provide contact details	Please see Annex-1
If you are interested in collaboration: please specify details and other important information you want to share with a potential company	Please see Annex-1
Interested areas of collaboration	Wastewater treatment, X-ray fluorescence analysis, Elemental analysis,
Specific R&D contribution you are seeking/offering	Steel industry; wastewater treatment using steel slag; Further information is attached.



Signature

Name: Abdallah A. Shaltout

Date: 09/02/2022

ANNEX-1

Report about the meetings with industrial sector (Ezz Steel, private unit) in Egypt

- **Website:** Ezzsteel Company, <https://www.ezzsteel.com>
- **Date:** 01 February 2022
- **Time:** 11:00 – 16:00 PM
- **Place:** Ezzsteel Company, Sadat City, Menoufia, Egypt
- **Ezz Steel Staff attending the meeting:**
 - [1].Dr. Abdulkader Almagraby, amagraby@esssteel.com
 - [2].Eng. Mohamed Mohamed, m_mohamed@ezzsteel.com
 - [3].Eng. Moahmed Amin, m.amin@ezzsteel.com
 - [4].Eng. Yasser Abdulmaguid, ymaguid@ezzsteel.com
- **National Research Center Staff attending the meeting:**
 - [1].Dr. Abdallah A. Shaltout, aa.shaltout@nrc.sci.eg

Ezz Steel is the largest steel company in Egypt and the Middle East and North Africa Region. In Egypt, it holds a 55% stake Al-Ezz Dekheila Steel Co., Alexandria, a 64% direct and indirect stake in Al-Ezz Flat Steel Company (EFS) in Suez and a 99% of Al-Ezz Rolling Mills Company (ERM) in 10th of Ramadan City and 100% of Ezz Steel, Sadata city. Ezz Steel was established as the Alexandria National Iron and Steel Company in 1982. It started production at 1986. Ezz Steel is ranked 87th of the world biggest steel producers as per the 2015 World Steel Association Ranking with total production capacity of 3.2 million tons per year (2015), representing more than half of Egypt total annual production of 6 million tons. The acceptable ideas by the company:

1. Utilization of different types of steel slags for environmental and industrial issues

The company produced a great quantity of steel wastes (steel slags). Three types of steel slags represents the wastes of the steel industry and these are:

- **Steel slag:** it produced directly from the electric arc furnace (EAF). Approximately, the output of the steel slag in the company equals 280-300 Tons/day. There is no actual utilization to the steel slag. A polish company is working with Ezz steel company at the moment for economic utilization of the steel slag.
- **Scales:** after the casting of the final product of the steel, it expose to air and/or water for cooling down. An oxidation layer (cortex or peel) was produced on the outer surface of the product and it is called scales. This type of steel waste represent a semi-finish product and it is very rich with iron. Based on the knowledge of the company, it is mainly iron oxide (Fe_2O_3). Each branch of the company produced 20-30 Tons/day from the scale. Although other industrial sectors in Egypt are buying this product, it could be utilized extensively in different branches.
- **Steel fume dust:** This type of dust represents the electric arc fumes produced during the melting process of the steel materials in the electric arc furnace (EAF). It represents the mirror image of the steel product. Automatic collection to the steel fume dust is established in the company. The output quantity of each branch of the company is approximately 50-60 Tons. It characterized by fine powder. Also, it is urgently required by other industrial sectors for cosmetic, fertilizers, and alloys industries.

2. Utilization of the local Fluorspar for steel industry

Fluorspar exist naturally as a mineral fluorite composed of calcium and fluorine (CaF_2) and it's the commercial source of fluorine. In Egypt, Fluorspar exist with a metallurgical grade of ~60-70% and it is usually contaminated with silica. In steel industry, Fluorspar is used as a flux to lower the melting temperature and increase the chemical reactivity to help the absorption and removal of sulfur, phosphorus, carbon and other impurities in the steel slag. In addition, fluorspar is also used for cement industry as a flux to speed up the calcination process and enables the kiln to operate at lower temperatures. On the other hand, the acid grade fluorspar is used in many different application such as; aluminum industry (to produce aluminum fluoride (AlF_3) which acts as a flux to lower the bath temperature in the manufacture of aluminum), hydrofluoric acid (HF) production, Fluorocarbons (refrigerant gases, propellants, etc.), electrical and electronic appliances, lithium batteries, pharmaceuticals, polymers and agrochemicals, petrochemical catalysts. The idea of this topic

is producing a high quality of fluorspar that can be used for steel industries and other industrial sectors.