



GREEK RAW MATERIALS DYNAMICS

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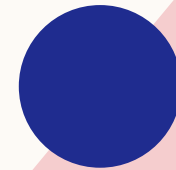
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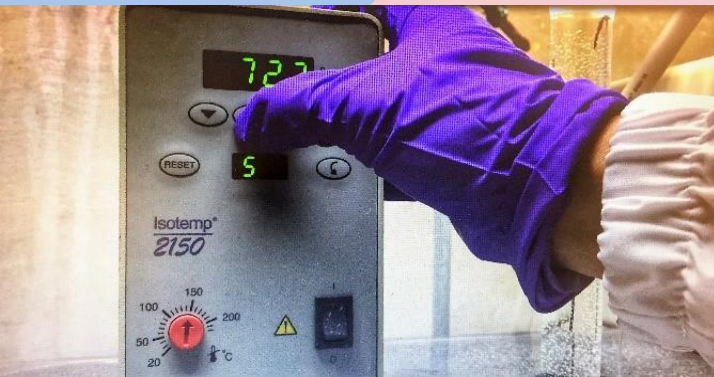


INFORMATION DESCRIBING THE IMAGE OF THE INDUSTRY (1/3)

- ✓ Number of employees: 75,000
- ✓ Production (in tons of final marketable products): 69,500,000 tons
- ✓ Sales (in bil. euros): 1.52
- ✓ Exports (in bil. euros): 0.79
- ✓ Participation in GDP : 3%
- ✓ Investments per year: 300-350 million euros
- A wide variety of minerals:
 - has world-class deposits and
 - has **high positions** in the world ranking concerning **production** (bentonite, perlite, pumice, attapulgite, bauxite, laterite, magnesite, hundertite)
- **Greek white marble, famous all over the world. Marble production, 6th in the world ranking**



INFORMATION DESCRIBING THE IMAGE OF THE INDUSTRY (2/3)



In the last 15 years it has distinguished:

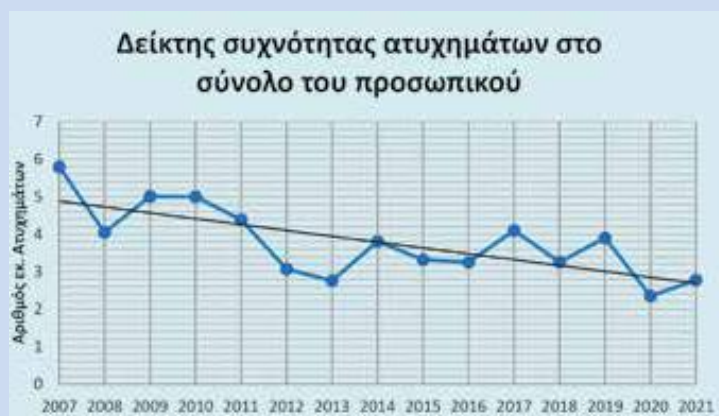
- Continuous reduction of accidents
- Intensification of rehabilitation
- Continuous increase in environmental protection and restoration costs
- Reduction of mining and processing wastes
- Increasing utilization of by-products (secondary raw materials)

Examples: utilization of marble chips or unmarketable volumes, fine magnesite as secondary raw material, fine perlite in ceramics, old waste deposits of mixed sulphides as secondary raw materials

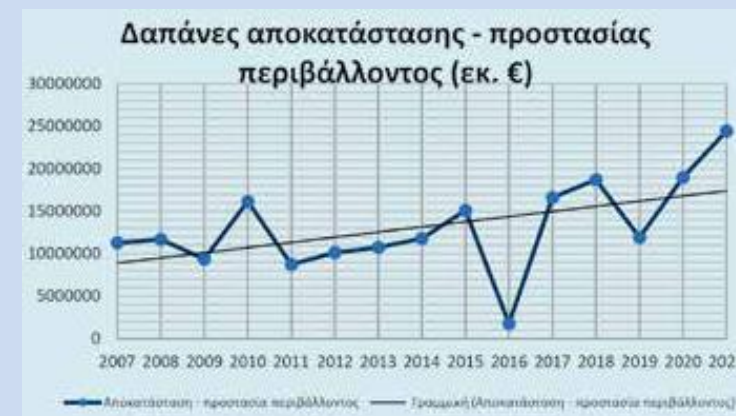


INFORMATION DESCRIBING THE IMAGE OF THE INDUSTRY (3/3)

Continuous reduction of accidents



Continuous increase in environmental protection and restoration costs



Reduction of mining and processing wastes



Intensification of rehabilitation





EXAMPLES OF INDUSTRIAL SYMBIOSIS

Marble: Marble quarrying aims at dimensional stones, with a recovery up to 10%, and produces a lot of chips.

The response to this challenge: down-stream integration for marble tiles production and then the processing of the remaining material either for construction solutions or for calcium carbonate applications.

As Greece is one of the biggest marble producers, this approach will reduce drastically the waste generated by this activity

Bauxite: bauxite is used in ordinary portland cement manufacturing.

The first stream is the consumption of the low grade bauxite after mining and primary processing and the second one is the development of suitable feed from the bauxite residue of the alumina metallurgy

Perlite: Greece is one of the biggest perlite fines generator in the primary processing of the raw perlite, they are used as supplier for the cement manufacturing, can be the basis for cementitious additives and potentially in the new generation of insulation materials





LAST 15 YEARS AND OUTLOOK FOR THE FUTURE OF MINING

- **Increase** in processing
- **Increase** in **post-mining land use**
- Supporting the **Green Transition** with our products (Bauxite-Aluminum, laterite-iron-nickel, magnesium products, lead, zinc concentrates, industrial minerals of specialized uses)

Outlook for future:

Utilization of copper, cobalt from already existing deposits. Serious evidence of rare earths

- Deep knowledge of the comparative advantages of our mineral resources. **Greek companies** are transforming into "**solution providers**" to customer needs and not simple producers of minerals and ores
- Need of experienced, qualified and highly skilled staff

Outlook for future:

- Automated operations on a wider variety of machines, IoT and machine interconnection, drones, new monitoring systems, automation in quality control, robotics applications in virtual reality work phases, lead to a new employee profile

This creates a great demand of knowledge and skills that cannot be automated

ERMA WILL CONTRIBUTE TO THE TRANSITION FROM LINEAR BROWN TO CIRCULAR GREEN ECONOMY

Brown Economy
Fossil Fuels for combustion engines, generators and power stations: oil, gas, coal

Green Economy
Functional Materials in e-motors, energy storage, energy conversion containing, for example, Co, Li, Pt, REE, Ge, Ga, Si, V

TRANSITION

Fundamental shift in the resource basis of a society





OUTLOOK FOR THE FUTURE OF MINING

- Implementation of large, long-lasting upskilling and re-skilling programs for 75% of today's employees

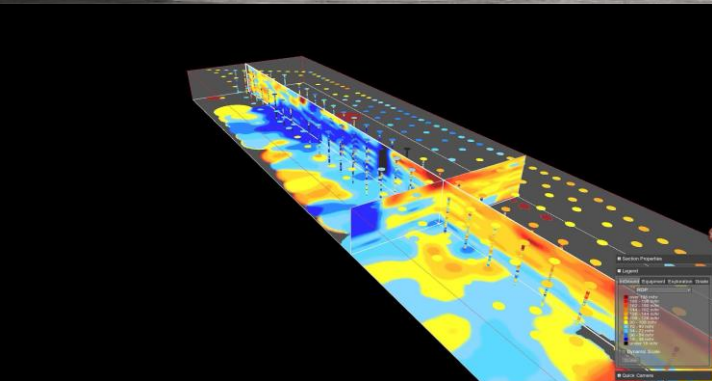
All that makes up the application of Industry 4.0 in the mining activity, leads to Miner 4.0

- Creation of new study programs at all levels of education, especially in Engineering
- Implementation of programs to capture exhaust gases from processes such as SO₂ and CO₂





CHALLENGES (1/2)



- Investment- friendly environment
- Modern regulatory framework for the mining activity:
 - ✓ Simplification of licensing
 - ✓ Covering regulatory gaps (modernization of environmental legislation, mining waste, Spatial Planning, Sea Side and Port Facilities etc.)
 - ✓ Dealing with malfunctions by forest services
 - ✓ Changes in quarrying legislation
 - ✓ Change of the current legislation (n. 4685/2020), so that as in the E.U. mining activity within NATURA areas (NATURA guidance for extractive industry), subject to conditions, is allowed

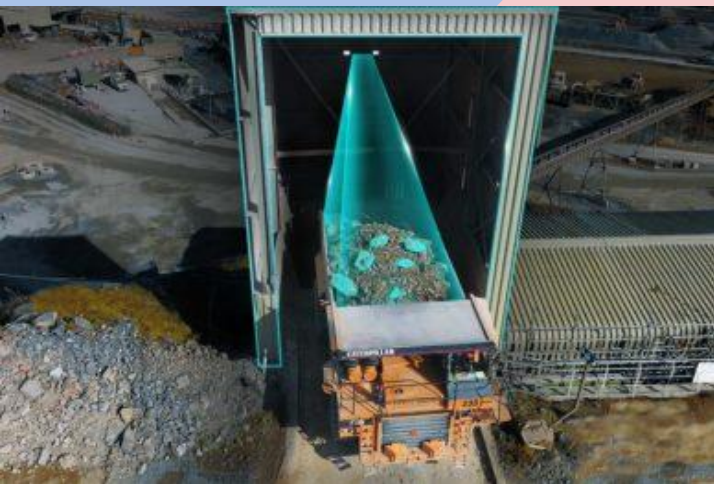


CHALLENGES (2/2)

- Dealing with contradictions at the European level (On the one hand: burdens and restrictions added to the mining industry, on the other hand need for greater security in the supply chain with raw materials of European origin)
- Rapid delivery of justice and legal certainty
- Smooth and efficient operation of the Public Administration
- Development of research activities to discover new exploitable deposits. In the public and private sector, research has weakened significantly without incentives from the state



COMPETITIVENESS



- The investment-friendly environment that we currently have not, contributed significantly to competitiveness. Competitiveness suffers because of absence of investment friendly environment
- Involvement of education and research in production
- Increase of vertical integration of products, strengthening of value chains based on the Greek Raw Materials
- Intensification of investment in innovation
- Electromobility
- Digitization
- Automations-robotics



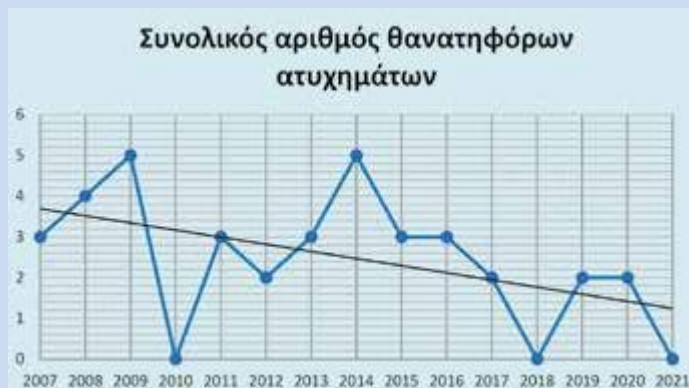
How IoT is helping mining companies **increase productivity**



OCCUPATIONAL HEALTH AND SAFETY

•THE NEW INNOVATIVE MEANS OF PRODUCTION WILL REDUCE OR EVEN ELIMINATE EXISTING RISKS

WORKERS' EXPOSURE TO POLLUTANT WILL BE ZERO



GMEA member companies significantly reduced the number of cases of COVID-19 by implementing strict protocols

- 2021 was one of the few years in the decade with zero fatal accidents.
- 55 accidents of low or moderate severity compared to 48 in 2020
- Frequency-severity indicators in 2021 (3.3 and 198.39 respectively) show a small increase compared to of 2020 (2.67 and 163.97 respectively)



CIRCULAR ECONOMY

- Research and development of new products of the mining metallurgical sector for new applications and longer life
- Greater production of secondary raw materials

Carbon Mining

Elimination-capture-utilization-storage of CO₂ emissions

The near future needs a big amount of investments for electrification, digitization, automation, R&D, training.

Are we capable of doing them? Otherwise we will lose our sustainability as a sector

THANK YOU

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