

LIFEPOSITIVEMgOFGD



LIFE15 ENV/GR/000338



Co-funded by EU's  
LIFE program



# LIFEPOSITIVEMgOFGD

## After LIFE Plan

## Project Summary and basic information

LIFEPOSITIVEMgOFGD is about designing, constructing and operating a novel air pollution abatement process, i.e. flue-gas desulfurization or flue-gas sulfur oxide level reduction, for demonstration in Grecian Magnesite's Yerakini facilities in Halkidiki where high sulfur content fuels are used for the operation of the site's kilns. The process targets to have a positive net environmental impact: a sustainable energy, water and cost efficient approach generating higher added value by-products compared to other abatement technologies.

<i>Project title:</i>	New desulfurization technology for SOx reduction with positive net environmental impact based on MgO reagents
<i>Project code:</i>	LIFE15 ENV/GR/000338
<i>Project Acronym:</i>	LIFEPOSITIVEMgOFGD
<i>Project Duration:</i>	1/7/2016 – 31/12/2019
<i>Total project budget:</i>	2,333,817 €
<i>Total eligible project budget:</i>	1,882,818 €
<i>EU/LIFE financial contribution:</i>	1,129,690 €
<i>Beneficiaries:</i>	Grecian Magnesite
<i>Location:</i>	Region of Central Macedonia, Halkidiki, Yerakini Mine Site
<i>Website</i>	<a href="http://www.betterlife-withmgo.eu">www.betterlife-withmgo.eu</a>



GRECIAN MAGNESITE is a privately owned mining and industrial company established in 1959. The company produces and commercializes Caustic Calcined Magnesia, Dead-burned (Sintered) Magnesia, Magnesium Carbonate (Raw Magnesite) and Basic Monolithic Refractories. A wide range of grades is currently produced, addressing practically all applications where Magnesia is used. GRECIAN MAGNESITE ranks among the top magnesia producers and exporters in the world with a very wide spectrum of grades and applications served.

[www.grecianmagnesite.com](http://www.grecianmagnesite.com)



## The Project's Accomplishments

A large scale dry desulfurization pilot plant was designed and constructed. It was specially designed to be able to use for the first time magnesium oxide as a sorbent in a dry desulfurization process and it is fully automated, monitored and operated centrally from a control room. It treats the flue gases emitted from one of the three rotary kilns in Grecian Magnesite's Yerakini Mine Installations in Halkidiki, Greece.

After the installation and initial operation of the pilot plant, there followed a long period of optimization studies, using different sets of operating conditions, different fuel mixtures - even different sorbents. The magnesium oxide sorbent required for the pilot plant is produced on-site, taking advantage old mine stockpiles, instead of freshly excavated magnesium carbonate, a depleting mineral resource.

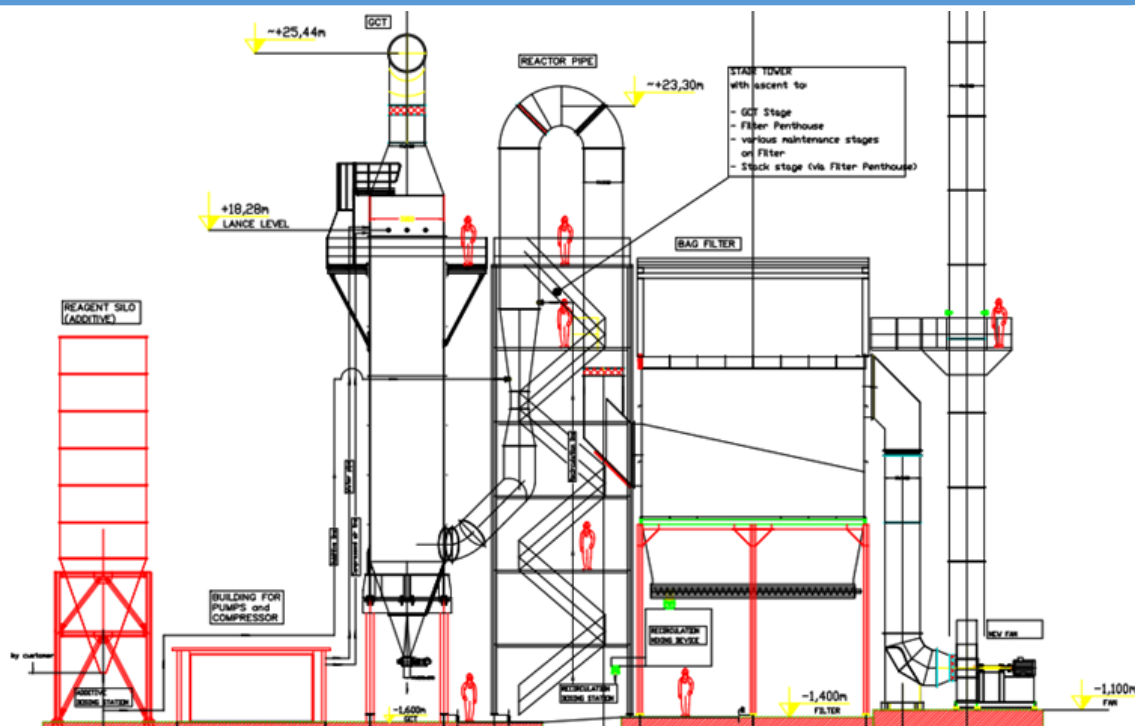


The pilot plant's by-product is a valuable for a variety of possible applications such as raw material for magnesium cements in construction products or as raw material for fertilizer production. In particular, Grecian Magnesite has made extensive testing to fully characterize the by-product and its properties and has prepared a comprehensive magnesium cement test report and a report on fertilizer application tests. These efforts came to fruition since the by-product has been initially approved by a major European panel manufacturer, to produce magnesia panels.

During the project, intensive dissemination efforts were made including general audience and special Replicability and Transferability workshops, media articles and conference presentations. The project has also prepared a technical file for the IPPC Bureau to consider the proposed technology as a Best Available Technique for the next Cement-Lime and Magnesia Best Reference Document review.

## In numbers

- The pilot plant treats 84.000 m<sup>3</sup> of flue gases every hour.
- SO<sub>x</sub> emissions are reduced by 51%, achieving a value of less than 1.500 mg of equivalent SO<sub>2</sub> per normal m<sup>3</sup>, which is the current BAT Emission Limit Value.
- At the current rate, 520 tons of equivalent SO<sub>2</sub> are prevented to escape in the atmosphere every year.
- 80% of the MgO sorbent used comes from the utilization of old mining waste. More than 20.000 tons per year waste are utilized.
- The pilot plant consumes 96 % less water and 24% less energy than an equivalent FGD plant based on wet desulfurization technology.
- At the current rate, more than 12.000 tons of by-product are generated by the pilot plant yearly. At the project's end, 15% of this is valorized. We target valorisation to reach 90% during the After Life period.



## The After LIFE Plan

The plan consists of the following itemized actions:

1. Continue the operation of the pilot plant
2. Increase the valorized volumes of the generated by-product
3. Perform further performance and operation optimization efforts
4. Replicate the technology within the same site
5. Continue and plan further dissemination activities
6. Monitor the project impact and socio-economic effects
7. Organise efforts to update the CLM BREF

### ***1. Pilot plant operation***

The pilot plant will continue to operate after the project's end with Grecian Magnesite's own funding for at least three years, because its role to desulfurise the flue gases of one of the calcination kilns is a priority for GM in order to reduce SOx emissions and improve its environmental performance. Moreover, GM targets for the long term sustainability of the pilot plant, i.e. to maintain an indefinite operation. For this reason plans are being put into place to increase the valorised volumes of the by-product, in order to minimise the net overall cost for the plant's operation. According to the techno-economic analysis of the technology, It is estimated that 90% valorisation of the by-product can cover 84% of the operating costs of the plant.

### ***2. Increase volumes of valorized by-product***

By the end of the project, 15% of the by-product is valorized by mixing it with a current commercial MgO grade for magnesium cement applications. The target is that within 3 years, this percentage will increase to 90%. This could be accomplished by the combination of the following efforts:

- Increase the mixing ratio with the current commercial MgO grade: 18%
- Mix the by-product with collected filter dusts from the site's kilns. These are pelletized and recycled back to the production process to produce a variety of low-grade commercial products (e.g. for refractory applications): 23%
- Finalize the agreement to supply the by-product for panel manufacture: 26%
- Sell to other panel manufacturers or other applications (e.g. as raw material for the production of fertilisers): 23%

These action points will be realised by Grecian Magnesite, using own resources in personnel (production, sales and marketing) and existing production equipment.

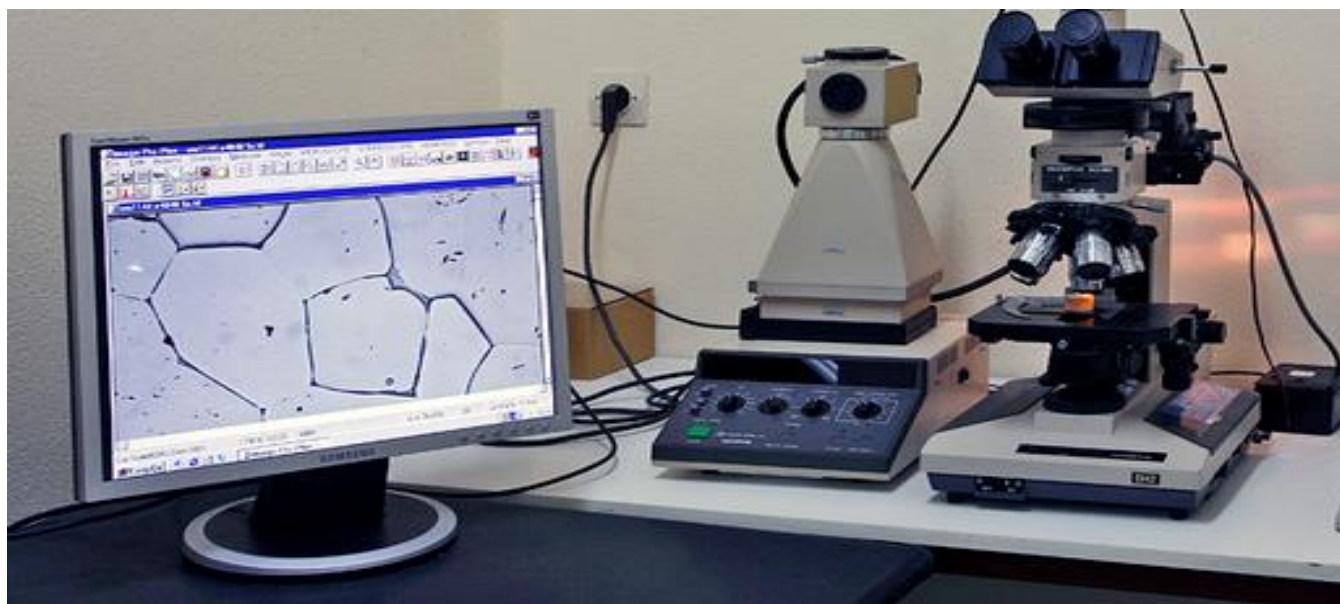


### **3. Further optimisation**

Efforts will be made to examine ways to further increase the performance of the pilot plant. These will concentrate on increasing the performance of the MgO sorbent by:

- Addition of synergistic additives (e.g. substances that act as oxidation catalysts)
- Blending with other alkaline substances

Any improvement in this area will directly reduce sorbent consumption and by-product generation, lowering operation costs. Grecian Magnesite will investigate the possibility to submit a research project proposal in the next two years in cooperation with academic partners that will receive partial funding from regional, national or European institutions.





## 4. Replication

Efforts will also be made to replicate the technology to one more kiln on the same site within the next two years, partially funded by Grecian Magnesite along with a bank loan. Similarities in operation between the two kilns make replication possible with minor adjustments.

## 5. Dissemination activities

The contact with the project's target audience will be maintained. This includes Euromines, IPPC Bureau, Greek Ministry of Climate and Change as well as other major stakeholders identified through the project. Main dissemination tools and actions for a three year period will be:

**Distribution of Layman's Report.** This will be available in Greek and English in both electronic and hardcopy formats and disseminated to the target audience.

**Website.** This will be kept active and updated regularly. It will be used as a major dissemination tool, containing all relevant information including results, deliverables, news, videos, layman's report and including the current plan. The following indicator values are targeted:

	Current Value, end of 2019	Value by the end of 2022
No. of users	1.925	4.000
No. of visits	7.508	10.000
No. of downloads	4.564	10.000

**Project video.** The video produced will be disseminated to the press, stakeholders and Grecian Magnesite's customers.

**Noticeboards.** The installed noticeboards will be maintained for the whole After LIFE period.

**Site visits.** These will continue and be available for all interested parties, including students from local faculties.

**Greek LIFE Task force.** Cooperation will continue with participation in GLTF events and nomination of LIFEPOSITIVEMgOFGD as the project of the month within 2020.

**Sectorial events.** The project's results will be presented in Magforum – Magnesium Minerals and Markets Forum 2020 (27-29 May, Amsterdam) or the corresponding Magforum of 2021 (spring, unknown location).



**Conferences.** Grecian Magnesite will pursue and cover expenses for conference participation. A selection of suitable conferences for abstract submission are the following:

- International Conference on Air Quality – Science and Application, 12th International Conference on Air Quality, 2020, 9-12 March 2020, Thessaloniki, Greece
- Air Pollution 2020, 28<sup>th</sup> International Conference on Modelling, Monitoring and Management of Air Pollution, 8–10 June 2020, Seville, Spain
- ICEEA 2020, 11<sup>th</sup> International Conference on Environmental Engineering and Applications, June 28-30, 2020 Budapest, Hungary.





## 6. Monitoring

Grecian Magnesite will continue to monitor the project impact and its socio-economic effects, through KPIs.



## 7. CLM-BREF update

The most significant task for the After-LIFE period is for the IPPC Bureau to consider the proposed technology as BAT for the next CLM BREF review that is to commence by April 2021. Grecian Magnesite plans to secure participation through Euromines, the European Association of Mining Industries in the Technical Working Group (TWG) that will oversee the review process and push for the adoption of the technology. Under moderate estimations, this process is expected to conclude by the end of 2022. The BAT candidate reference document has already been prepared and will be submitted it to the TWG as soon as the body forms.





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## CONTACT INFORMATION

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