



Waste
or
Resource?



Phosphogypsum disposal management and Water preservation

For every tonne of phosphoric acid as P₂O₅ produced using the wet process, 4.5 to more than 5.5 tonnes of phosphogypsum are generated, depending on the quality of the phosphate rock. The free water in the gypsum cake off the filters is highly acidic, having a pH as low as 2.0. While commercial uses, in agriculture and in manufacturing gypsum board and Portland cement, consume less than a few percent of this by-product, the vast majority is disposed of on land in gypsum stacks or is discharged into water bodies.

Taking into consideration:

The specificity of GCT's phosphogypsum.

The expected Environmental, Operating & Economic Advantages of new wet discharge :

- ❖ Protection of land, surface and ground water
- ❖ Reduction dust emission
- ❖ High recovery rate of P₂O₅
- ❖ Low downtime ratio
- ❖ Reduced maintenance system
- ❖ Low operating cost

For its new projects, GCT opted for a "Wet stacking method" with implementation of the following mitigation measures:

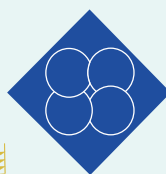
- ❖ Bottom liner
- ❖ Water underdrain system
- ❖ Lateral drain system
- ❖ Pond water
- ❖ Monitoring and reporting system

To preserve water resources, GCT has planned new projects:

- ❖ Reuse of waste water from SONEDE desalination station
- ❖ Reuse of reclaimed waste-water after tertiary treatment
- ❖ Desalination of sea water

Research & Development

- OBJECTIVES
- GCT PORTFOLIO OF LICENSES
- PARTNERSHIP WITH UNIVERSITIES
- QUALITY IMPROVEMENT AND PRODUCT INNOVATION
- URANIUM EXTRACTION FROM PHOSPHORIC ACID
- NEW RESEARCH CENTERS
- ENVIRONMENTAL RESEARCHES



GROUPE CHIMIQUE TUNISIEN



Innovation based on research and development is the foundation of GCT's strategy for profitable growth and business success. Highly-qualified Engineers are working to find answers to the challenges of the future and respond quickly to market developments.

Objectives

Objectives for Our Research & Development :

- ❖ Reducing production costs.
- ❖ Satisfaction of customer requirements.
- ❖ Development of new manufacturing processes.
- ❖ Treatment of different types of waste.
- ❖ Product diversification.
- ❖ Valuation of strategic elements.

GCT is considered one of the companies that is equipped with advanced and extensive research capabilities to improve the production.

It is the policy of GCT to conduct all business in a manner that complies with environment, health and safety standards.

GCT portfolio of licenses

GCT has its own broad portfolio of technologies and patents. The most important licenses are:

- ❖ Production of TSP from Tunisian phosphate rock.
- ❖ Removal of cadmium, iron and heavy metals from phosphoric acid.
- ❖ GCT process of reduction of heavy metals in MGA.
- ❖ GCT process of regeneration of spent catalyst.
- ❖ Removal of cadmium, fluorine and chlorine from phosphoric acid.
- ❖ Production of phosphoric acid from Tunisian phosphate rock.

The patent relative to phosphoric acid production referred to as "License SIAPE – GCT Process" was successively updated in 1968, 1979, 1995, and most recently in 2009.

Plants using SIAPE Process were constructed in the following countries: China, Syria, Turkey, Bulgaria, and Greece.

Our Research & Development Topics are organized around Five Axes:

- ❖ Process innovation
- ❖ Quality Improvement
- ❖ Strategic elements Extraction from phosphoric acid
- ❖ Product innovation
- ❖ Environmental research and safeguard

Partnership with Universities

The GCT considers that innovation increasingly depends on the ability of university and industry experts to work together across a number of topics related of the GCT activities.

The universities supplying talent and ideas and the companies demanding them. The first step to a healthy partnership is assessing the core academic strengths of the university and the core research competence of the company to identify promising opportunities for collaboration.

In this context we have built since 2006 a new system of collaboration with the University based on the sponsorship of university researchers to address questions related to the activities of the GCT in order to propose solutions to issues relating to the methods of manufacture, extraction of strategic elements, improving the quality by reducing the levels of impurities in the phosphoric acid industry. The researcher prepares a thesis or a master and receives a monthly allowance which will be paid by the GCT. Progress meetings will be scheduled by mutual agreement in order to complete and complement the research previously scheduled by mutual agreement.

Among subjects treated with Tunisian universities during the last three years, we cite the following examples:

- ❖ Purification of the industrial phosphoric acid to reach the food grade.
- ❖ The extraction of uranium from the industrial phosphoric acid.
- ❖ Treatment of air emissions from sulfuric and phosphoric units.
- ❖ Manufacture laboratory scale multitudes liquid fertilizer formulations.
- ❖ Manufacture laboratory scale multitudes solid fertilizer formulations.



Quality improvement and product innovation

The processing industry of acid phosphates and fertilizers is based on the production processes. To survive in a demanding market, and still be successful, it is necessary to achieve the high level of the products quality. High product quality results from the high quality of manufacturing process.



Our research activities are focused on the development of innovative production processes that will make us even more competitive. We are also continuously improving our existing products.

In developing new products we look at the needs of our customers and take advantage of the opportunity offered by introduction of new products with high added value.

For example we developed an innovative products based on the incorporation of elements such as Zinc, Sulfur and Boron in fertilizers manufactured in our production units.

In this regard, a consistent research work was devoted for the identification of the best process parameters required for the production of:

- ❖ DAP with Zinc,
- ❖ TSP with Zinc,
- ❖ DAP with Sulfur,
- ❖ DAP with Boron.

The goal of the GCT research is to find appropriate systematic approach to quality improvement in our products.

Our Research & Development contribute to:

- ❖ Enhancing the efficiencies of our productions plants.
- ❖ The development of innovative processes to remove impurities such as cadmium and heavy metals from phosphoric acid.
- ❖ The strategic goals by extraction of the Uranium and Rare Elements from phosphoric acid.
- ❖ Better serve the "Scientific Agricultural" by creating special fertilizers designed for various soils and growing conditions.
- ❖ Preservation of the Environment and sustainable development.

Uranium Extraction from phosphoric acid

Phosphate plays an important role as fertilizers, animal feed supplements and additives in food. They also contain some quantities of uranium. Sedimentary phosphate rock deposits contain uranium in varying concentrations, generally between 30 and 300 parts per million (ppm) U₃O₈. The Phosphoric acid derivate from the phosphate transformation is an attractive source for uranium. It contains enough uranium to serve as a potential fuel source for nuclear power plants.

The recherche conducted in collaboration with the Gabes National School of Engineers (ENIG) concerning the extraction of uranium from the industrial phosphoric acid have yielded satisfactory results including:



- ❖ Consistently high uranium recovery (greater than 85 per cent) from the phosphate.
- ❖ Purification and concentration of uranium is achievable without significant uranium losses.
- ❖ Chemistry of the phosphate stream is unaffected except for the removal of uranium.

NEW RESEARCH CENTERS

GCT has planned the construction of three research centers: in Sfax, Gabes and M>Dhilla. The new research centers whose construction is planned to start in 2014:

- ❖ will include experimental laboratories and pilot plants dedicated to research in processing chemistry in connection with the activities of the GCT and,
- ❖ will give us the opportunity to attract qualified students and researchers from specially Tunisian universities who are proficient in these critical elements of our business.



Environmental Researches

Environment is considered by the GCT as the source of value creation that contributes positively to our development. GCT involves the development of a new research and innovation strategy for the waste minimization in the phosphoric acid industry.

The main aim is the development of ecologically sustainable, environmentally friendly, resource and energy saving industrial process technology for the production of a wide-class of phosphorus-containing substances.

To ensure the success of its Commitment to serving sustainable development strategy, GCT constantly seeks novel technologies which are tested in laboratory and on a pilot plant scale for the treatment mainly of:

Reuse of phosphogypsum

Current research work is focused on testing the use of by-product phosphogypsum the following application:

- ❖ Recovery of sulfur values and construction materials.
- ❖ Conditionning sodic soils in agriculture.
- ❖ Substitution of sand in clay bricks.

Gas emissions

As part of its commitments to reduce emissions of air pollutants generated by Phosphoric and TSP units to be in conformity with the national standards GCT has undertaken a comprehensive program consisting of testing at a pilot plant scale a treatment that includes:

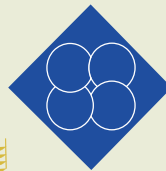
- ❖ Chemical precipitation
- ❖ Electrochemical oxidation
- ❖ Chemical absorption.

Liquid waste products

The main objective of the research activities undertaken in this field is to find out the best solutions for conditioning and recycling liquid streams between the different units of the plant. The final objective being Zero-outflow for liquid effluents.

Partnership

- PROJECTS PARTNERSHIPS
- GCT'S SUBSIDIARIES
- TIFERT PHOSPHORIC ACID PROJECT



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Projects Partnerships

The development strategy of the Tunisian phosphate sector is based on implementing new projects with partners. GCT successfully implemented SACF JV in China with CNCCC and TIFERT in Tunisia with CIL and GSFC from India. GCT is approaching traditional customers with potential capacity of marketing phosphatic fertilizers to launch new projects.



SACF

GCT and CNCCC (the Chinese partner) launched a merger process aimed at enlarging the production capacity to 800 000 T/Y of NPK.



TIFERT Phosphoric Acid project

TIFERT was incorporated in September 26, 2006.

TIFERT will process around 1.5 million per year of Tunisian phosphate rock. This should raise the annual production capacity of CPG from 8.5 million to 10 million tons P_2O_5 / year. All MGA 54% (360 000 T/Year) will be exported in equal shares to CIL and GSFC.

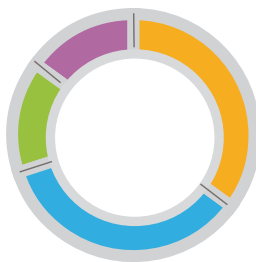
Process for phosacid production is a Tunisian (SIAPE) new design reactor of 1100 T P_2O_5 /day.

TIFERT should rigorously commit with the international environmental standards.

Main Shareholders:

Principal Shareholders

● CPG	35%
● GCT	35%
● CIL-INDIA	15%
● GSFC-INDIA	15%



SPIN OFF

Moreover, GCT is engaged to support actively the national programme of encouraging the creation of small and medium size enterprises in the frame of "spin off", through acquiring 16,60% stake in the equity of the new "spin off" fund management company (SAGES).

TIFERT PROJECT

Skhira Site




- ❖ Creation : September - 2006
- ❖ Head Office : 7, Rue du Royaume d'Arabie Saoudite
– 1002 Tunis – Belvédère.
- ❖ Plant : LA SKHIRA - TUNISIA
- ❖ Registered Capital: 225 million TND (185 million US\$)
- ❖ Production Capacity: 360 KT P_2O_5 / Y
 - ❁ Phosphate consumption: 1.4 million T/Y (CPG)
 - ❁ Sulphur consumption: 0.36 million T/Y (Imported)
- ❖ Investment: 497 million US\$
- ❖ All production is to be taken off by Indian partners CIL and GSFC
- ❖ Shareholding: Tunisia 70% (CPG & GCT),
India 30% (CIL & GSFC)
- ❖ Employment: 465
- ❖ Commissioning: 2013

TIFERT should rigorously commit with the international environmental standards.



13 SUBSIDIARIES




GROUPE CHIMIQUE TUNISIEN

Business line: Chemistry
Capital: 476 MDT
GCT Share: 100%




ALKIMIA

Business line: Chemistry
Capital: 19.47 MDT
GCT Share: 39.1%




TIFERT

Business line: Chemistry
Capital : 225 MDT
GCT Share: 35%




Sino-Arab Chemicals Fertilizers

Business line: Chemistry
Capital: 17.5 MUSD
GCT Share: 60%



CIL

Business line : Chemistry
Capital : 282 391 058 Rs
GCT Share : 1,72%




FRDCM

Business line: Investment Fund
Capital : 32 MDT
GCT Share: 19.61%



POLITECH

Business line: Industry and Technology
Capital : 20 MDT
GCT Share: 80%




TECI

Business line: Engineering
Capital : 8.4 MDT
GCT Share: 40.25%



CITECH SBZ

Business line: Industry and Technology
Capital : 5 MDT
GCT Share: 80%



BFPME

Business line: Banking
Capital : 100 MDT
GCT Share: 22%




SODESIB

Business line: Investment Fund
Capital : 5 MDT
GCT Share: 80%



SEPJ

Business line: Environment
Capital : 8 MDT
GCT Share: 100%

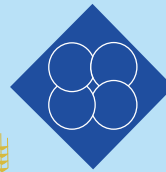


GRANUPHOS

Business line: Chemistry
Capital: 1 MDT
GCT Share: 10.26%

Sustainable human development

- SOCIAL COMMITMENT
- MANPOWER
- TRAINING
- SAFETY AND SECURITY MANAGEMENT
- IMPLEMENTATION OF CORPORATE
- SOCIAL RESPONSIBILITY



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SOCIAL COMMITMENT

The GCT considers that the pillars of sustainability can be described as such:

- ❖ *Healthy Environment*
- ❖ *Economic Growth*
- ❖ *Social Justice*

This strategic orientation goes hand in hand with GCT's ambitious industrial development program. The Group considers sustainable development as an important source to reduce costs and strengthen competitiveness.

HUMAN RESOURCES

Human resources at GCT are considered one of the most important elements of the success of the enterprise due to its active role in the development of the capacity of the company and providing the necessary human resources whether workers or officers in all specialties as well as providing a sound social environment within the enterprise and in its outside environment.

The last two years 2011 and 2012 can be considered years of strengthening cooperation and communication between the GCT and civil society living in cities where there are industrial sites belonging to the GCT.

GCT has clearly expressed and demonstrated that social engagement is oriented towards a harmonious integration of the Group formed by the young people, in the Tunisian social environment.

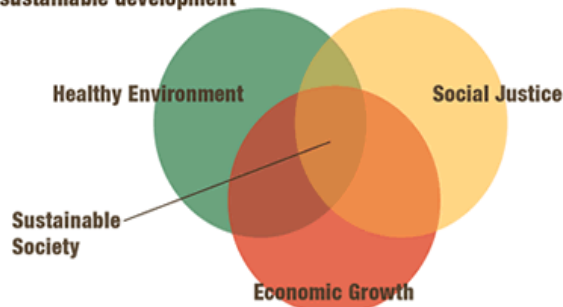
In other words, GCT believes that these young people will be helped to gain greater independence so that the spirit of innovation, creativity and professionalism can be proven and demonstrated.

SOCIAL ACTIVITIES

The policy of the GCT on the social aspect is based on maintaining all social activities enjoyed by its staff to establish satellite environmental companies under its auspices to provide opportunities for the unemployed.

In the regions where GCT operates, it contributes to the development of services such as roads, building schools, eliminating slums and creating green areas, which traditionally fall under municipal responsibilities.

The three components
of sustainable development



GCT PARTICIPATION IN THE NATIONAL ECONOMIC GROWTH

The GCT plays a major role in the national economy. It mobilizes significant resources towards agriculture by:

• “Precision agriculture” concept

Through research sponsored by the GCT and in collaboration with instances belonging to the Ministry of Agriculture, GCT works to improve yields while maintaining ecosystem and the environment.

This reflects the desire of the GCT to highlight the concept of sustainable development through agricultural practice respecting «the right amount of fertilizer at the right place at the right time» This should allow the use of chemical fertilizers in the best conditions.

- ❖ Revitalize the local fertilizer market.
- ❖ Knowing the soil and its needs.

The flagship project «National Soil Fertility Map» is a major contribution of GCT for agricultural development. The primary objective is the evaluation of soil fertility on the whole country and needs fertilizer quantities and qualities to ensure better returns.

This project was initiated with the INAT (Institut National Agronomique de Tunisie) and deserves to be supported financially.

• Promoting entrepreneurship and innovation for sustainable agriculture

To raise the level of Tunisian agriculture and raise challenges and in accordance with the objectives of national competitiveness, GCT launched a driving program with the Ministry of Agriculture through UTAP (union tunisienne de l'agriculture et de pêche) for the extension of solid fertilizers manufactured by GCT applications through open fields on different vegetable crops and fruit trees.

This project, which began in 2009 is funded and sponsored by the GCT has put innovation and entrepreneurship at the heart of its mission.

GCT is ready to further mobilize the human and financial resources to ensure the integration of our initiatives in the context of sustainable development, and recognizing the need to provide support and advice at different levels.





MANAPOWER

Since the Revolution (January 2011) GCT adopted a markedly influenced by social policy claims. The massive recruitment of employees focused workforce of 6939 people GCT which caused an increase of about 57% compared to 2010.

The number of employees at GCT witnessed in the last four years an important increase mainly through the process of integrating sub-contracted employees as permanent hires.

This was the result of social changes experienced in Tunisia during the year 2011 and out of a desire by the company to settle the status of vulnerable groups in the context of social solidarity and achieving social peace.

Category/ Year	2009	2010	2011	2012
Permanent hires	4499	4418	6920	6939
Temporary hires	17	17	-	-
Total	4516	4435	6920	6939

The following table highlights the scope of manpower development in the above-mentioned period:

Because the integration targeted mostly one category of employees, this resulted in a decline in supervision rate to the level of 5.85% and to resolve this problem on and make up for future retirees, the company launched a new hiring program that would take into account the decrease in the proportion of supervision and strengthen the competencies required in the sector.

Training



Generally, training is the most important technique of human resource development. Also, training is important to develop the employee and make him suitable to the job.

For the GCT, training and development are the most important to improve the skills of employees and change their attitudes to enable them to function more effectively to achieve the objectives of the group.

In order to improve them, GCT focuses on organizing training sessions in collaboration with different specialized institutions and encourages them to participate in workshops and if necessary attend university courses.

GCT keeps steadily organise required training sessions and awareness campaigns to all its employees and staff among to keep up with the company's strategy with regards to safety, quality control, and respect for the environment.

Category/ Year	2009	2010	2011	2012
Permanent hires	4499	4418	6920	6939
Supervision rate (%)	9.94	9.89	6.21	5.85
Entry rate (%)	3.85	1.94	59.50	3.01
Number of Training days	14 932	15 713	3.723	8 389

Objectives

- ❖ To ensure that sufficient time and effort are invested at all levels of management to people management
- ❖ To help employees to improve their basic skills has a direct impact on their performance and productivity
- ❖ To develop specific programs with a particular emphasis on equipping employees to meet their challenges and objectives



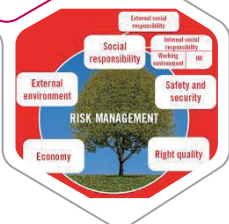
SAFETY AND SECURITY MANAGEMENT

Improvement of GCT industrial safety is important not only in human terms, to reduce workers pain and suffering, death toll and environmental & societal impact in case of major accidents, but it is also a way of ensuring that enterprises are successful and sustainable in economic terms.

In the GCT, safety is seen as a key factor for successful performance.

During the last period, safety indicators have negatively evolved due to the social climate change resulting from the intensive integration operations for handling agents who lack the required experience to deal with equipments and working conditions.

These forced the company to think to a special configuration program in the field of occupational safety.



Among the activities that have been realized beside regular ones:

- ❖ Organization of the «Safety Month» in the GCT plants.
- ❖ Organization of the "Safety Audit" for the headquarters in Tunis and outbuildings.
- ❖ Training and awareness of new hires.
- ❖ Realization of an expertise by a reinsurance company "CHARTIS" when visiting the GCT factories and experts from the Swiss-reinsurance for all plants.
- ❖ Conduct a hazard study for the plant of ammonium nitrate in Gabes by a French design office.

A new safety program will have been adopted in the all GCT units. The Safety indicators are measured to evaluate the safety performance.

GCT safety performance will have progressively and measurably improved in terms of reduction of reportable accidents at work, occupational diseases, environmental incidents and accident related production losses. It is expected that an "incident elimination" and "learning from failures" culture will develop where safety is embedded in design, maintenance, operation at all levels in GCT units.

This will contribute in a major way to sustainable growth for all GCT industry and improvement of social welfare.

Implementation of corporate social responsibility



The importance of CSR on both society and the industry has been widely discussed in the last two decades. Studies have demonstrated the positive impact of CSR on companies' reputation, customer satisfaction, employees' commitment, and financial performance. Consequently, GCT Company is increasingly incorporating CSR in their business strategies. However, implementing CSR remains a challenge for GCT.

The GCT program in the implementation of corporate social responsibility able to:

- ❖ Adopt governance and responsible management.
- ❖ Engage the communities of reception and the other parts fascinating and interested.
- ❖ Contribute to the social and the development of the community.
- ❖ Protect the environment
- ❖ Safeguard the health and the safety of the workers and the local population.



In collaboration with Tunis International Center for Environmental «CITET» with the support of National Agency of Environment Protection «ANPE» and Deutsche Gesellschaft für Internationale Zusammenarbeit «GIZ», the «GCT» is engaged to improve its environmental communication while working out and by implementing a strategy and an action plan of interns and external environmental communication in the long run on the topics environmental. This strategy supports on:

Transparency - Relevance - Credibility - Reactivity - Clearness

This strategy is able to:

- ❖ Better include/understand waiting of the parts interested and to support mutual confidence.
- ❖ Help to include/understand environmental engagements of the company.
- ❖ Improve their perception of the company.
- ❖ Promote the achievements and the performances.
- ❖ Answer on the environmental risks.
- ❖ Increase the confidence of the socials partners.

The Future

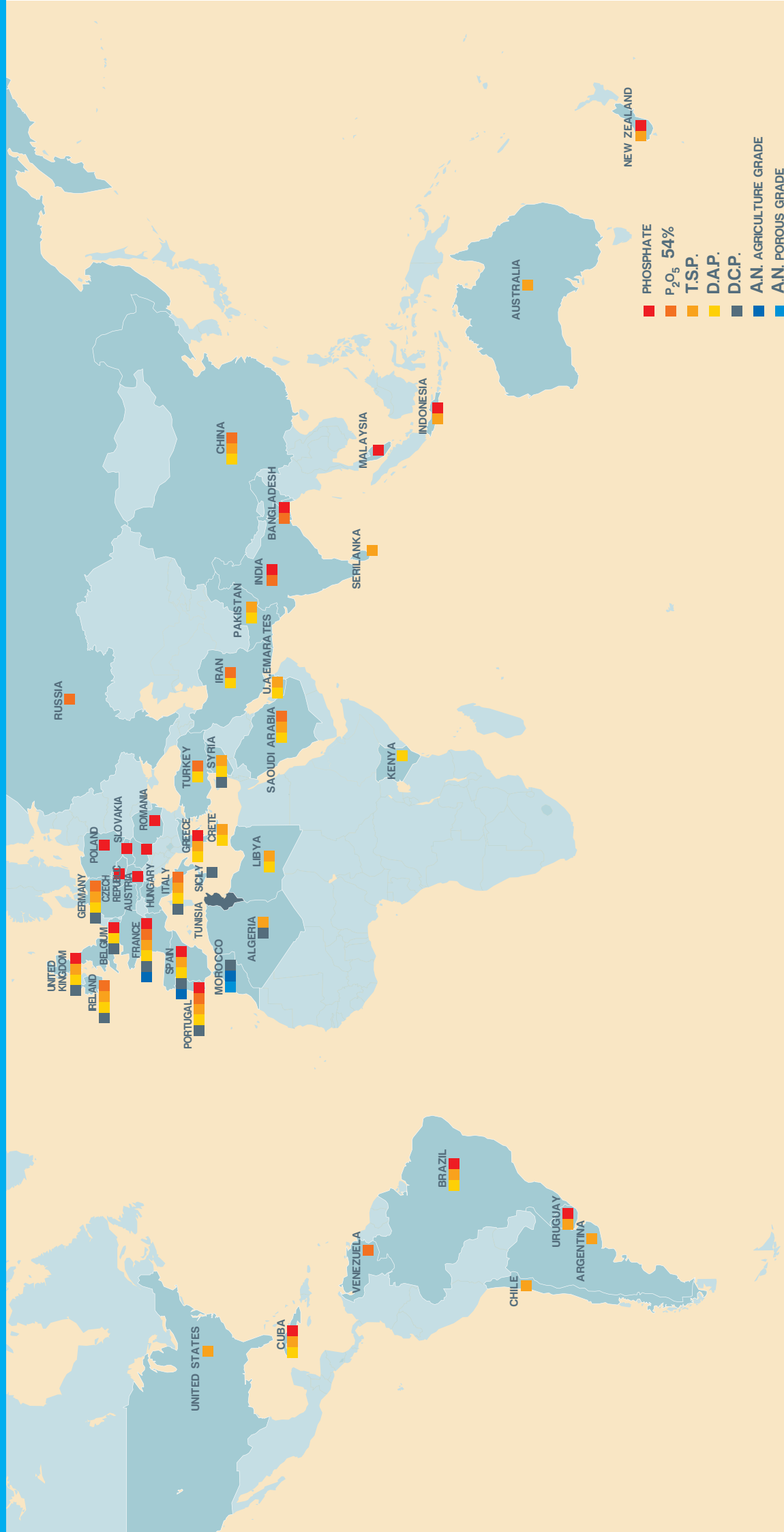
For GCT's new development projects (TIFERT & Mdhilla 2) : The best available technologies «BAT» for environment preservation (30% of the projects cost) have been adopted (Double Absorption, Heat Recovery System, Water Desalination, Fluorine recovery, closed loop water),

The target is to achieve sustainable development as a new approach for the GCT's fertilizer industry through production and innovation integrated environmental protection,

The GCT will be on the fore front of best available technology.



WORLD WIDE PHOSPHATE ROCK AND FERTILIZERS EXPORT





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