

Can Mauritania become a major gypsum exporter: Opportunities and Challenges ?



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1.Introduction : What's gypsum?

- ❖ The word gypsum is derived from the Greek word γύψος (gypsos), "chalk" or "plaster".
- ❖ It is a soft sulfate mineral salt composed of calcium sulfate dihydrate, with the chemical formula **$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$** .
- ❖ It is one of the most naturally occurring sulphate minerals and one of the most widely used industrial minerals in the world.
- ❖ Gypsum is deposited from lake and sea water, as well as in hot springs, from volcanic vapors, and sulfate solutions in veins.
- ❖ Pure gypsum is white, but other substances found as impurities may give a wide range of colors to local deposits. Impurities include SiO_2 , Al_2O_3 , MgO , K_2O , Na_2O , etc...

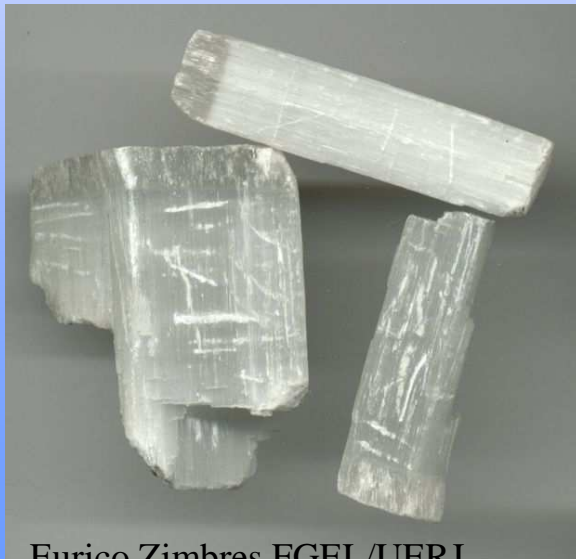
1.Introduction: What's gypsum?

- ❖ Gypsum can naturally occur in different forms :
 - ❖ massive, dense form (alabaster),
 - ❖ fibrous form (satin spar)
 - ❖ transparent crystals (selenite).
- ❖ Gypsum can also be found in the form of sand (very rare) :
 - ❖ the White Sands National Monument in the US state of New Mexico
 - ❖ The Nadaghmecha marine sebkha near Nouakchott in Mauritania
- ❖ Gypsum is also formed as an industrial by-product :
 - ❖ **Phospogypsum** – Major by-product of phosphoric acid production :
phosphate + sulfuric acid --> fertilizer + phosphogypsum
 - ❖ **Desulfogypsum** – Obtained from the desulfurization of combustion gases in coal burning power plants (Harmful SO_2 gas is turned into $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$).

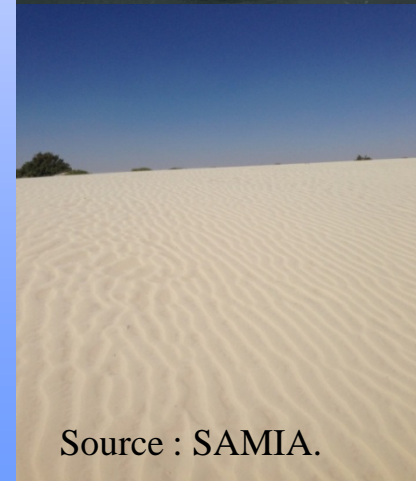
Forms of Gypsum



Source : SAMIA.



Eurico Zimbres FGEL/UERJ



Source : SAMIA.

1. Introduction: How gypsum is mined?

Natural gypsum is extracted from open-pit quarries or underground mines.



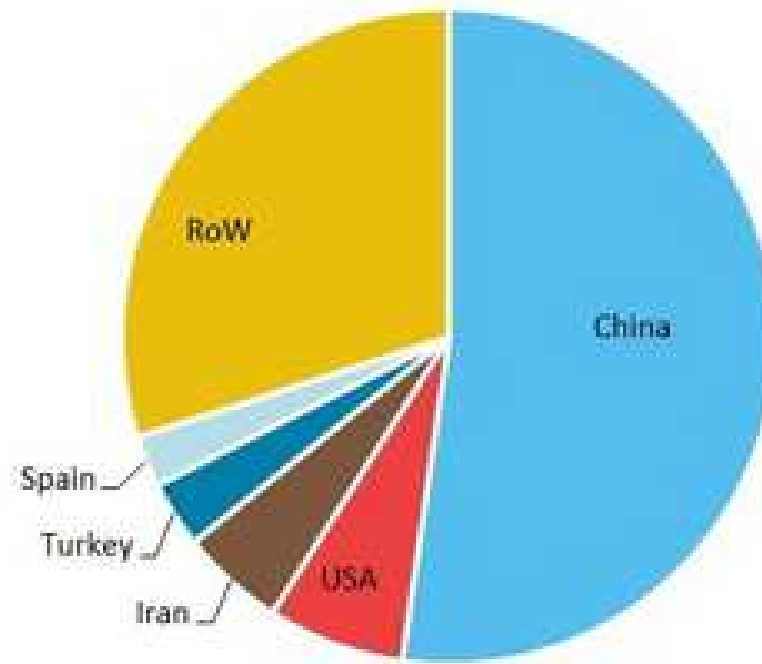
open-pit gypsum quarry in Mauritania



underground gypsum mine in UK

Gypsum worldwide production amounts to about 250 million tons

Gypsum Mine Production Globally



Source : Smithers Apex: [“The Future of Gypsum: Market Forecasts to 2023”](#)

1. Introduction : gypsum uses

Nearly all gypsum is used in three prime applications:

1. building construction (plaster, plasterboard, etc.): **33.3% of the market.**
2. cement (where it is used as a setting retarder): **60.9% of the market.**
3. agriculture (mostly for soil conditioner and fertiliser).

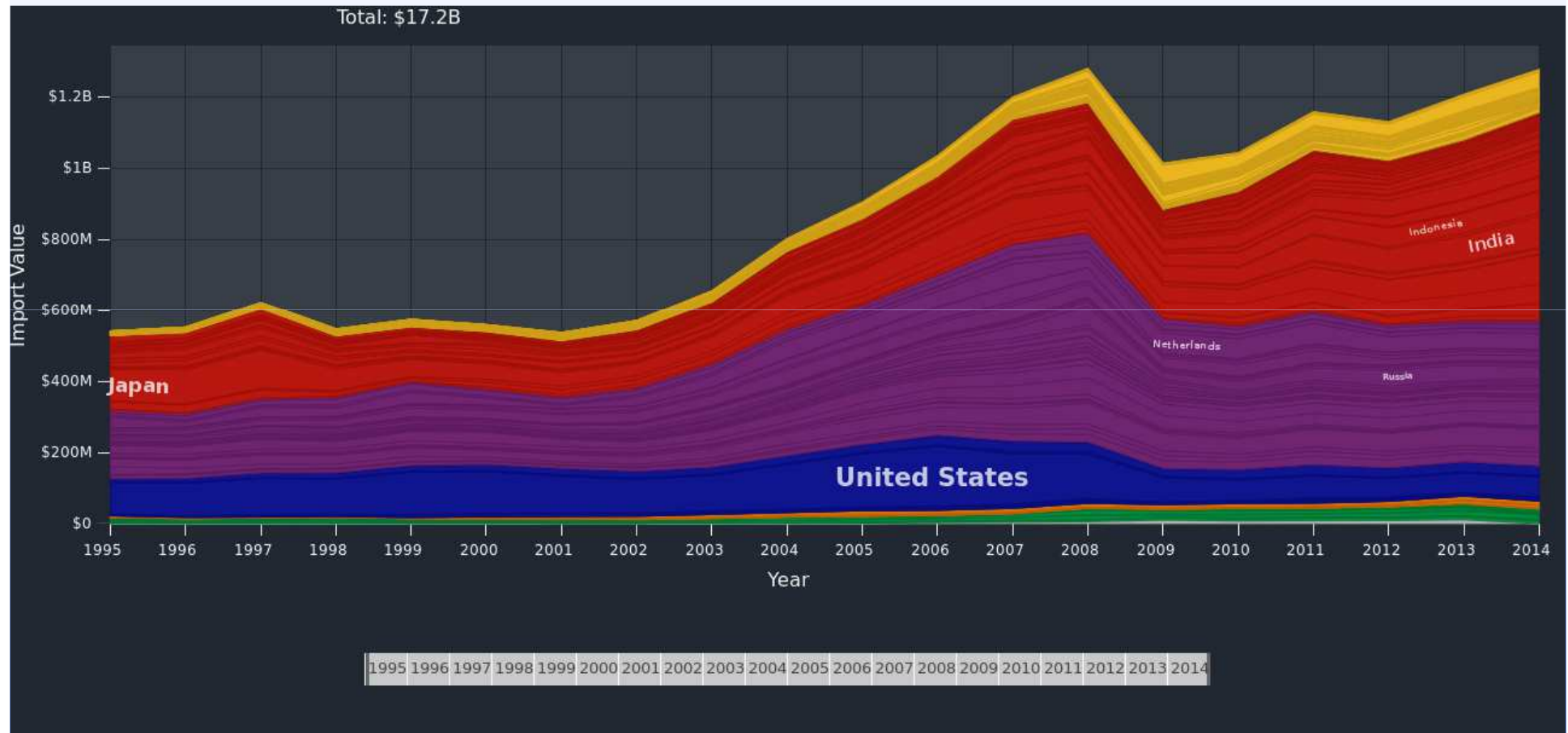
1. Introduction : gypsum markets

- Patterns of gypsum consumption vary geographically :
 1. **Mature markets** : US, Western Europe, Japan, etc..

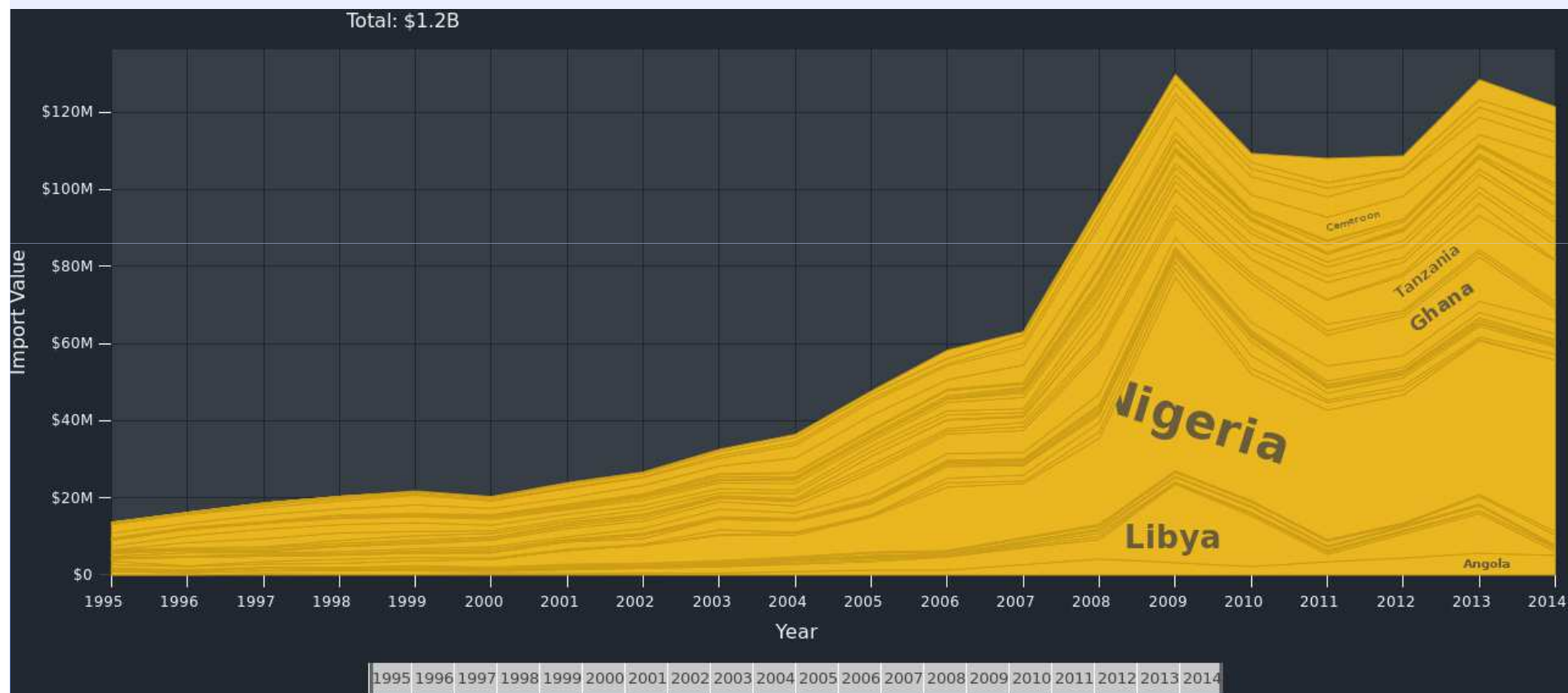
Most of the gypsum consumed is used in wallboard.
 2. **Growing markets** : Southern Europe, India, China, etc...
 3. **Future markets** : Africa, Latin America, etc...

In these markets, dry construction is still in its infancy, although growing rapidly. In contrast, huge investments in infrastructure have led to booming markets in cement.
- The global gypsum market is forecast to grow at a CAGR of 9.9% to reach nearly US\$2.4 billion by 2018 and US\$3.8 billion by 2026.
- Major drivers in gypsum consumption are :
 - Population growth
 - Urbanisation and industrialisation
 - GDP per capita growth

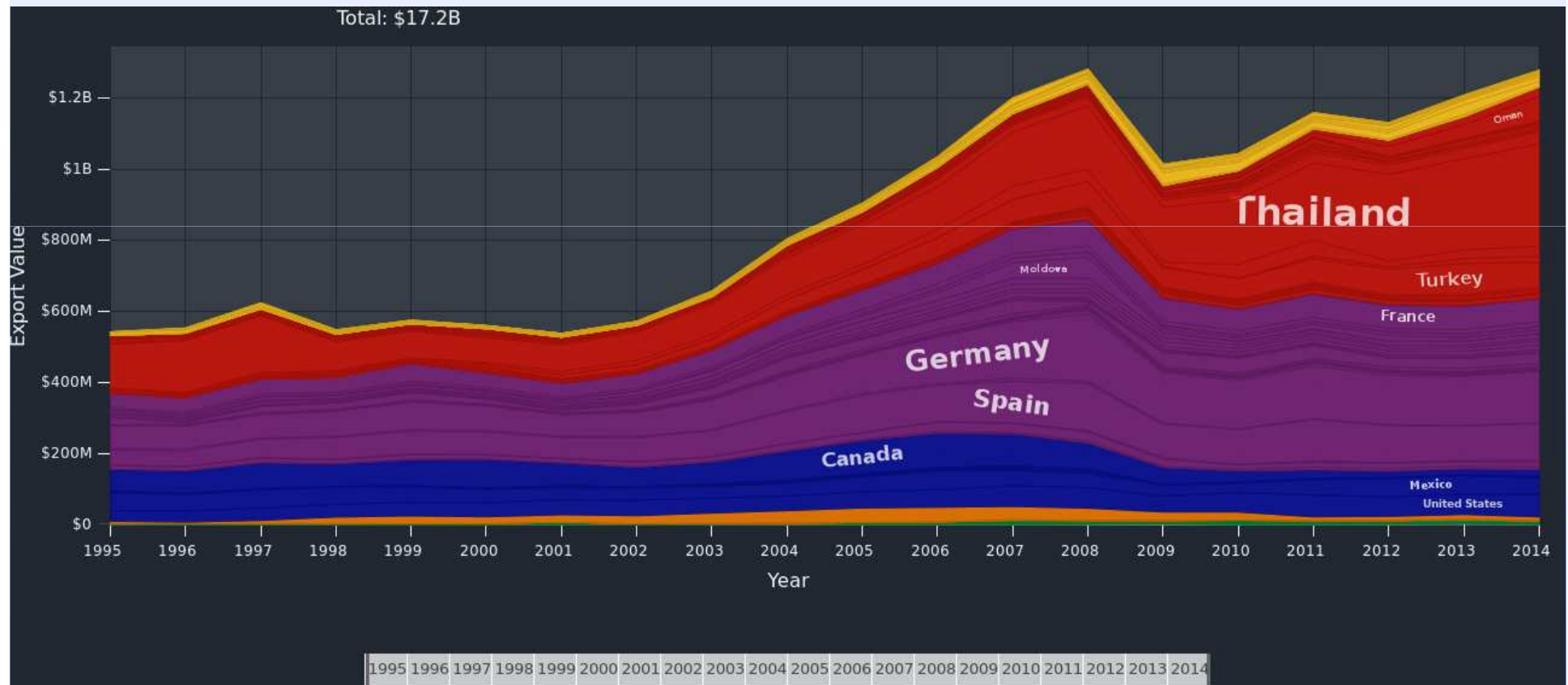
Which countries import raw gypsum?



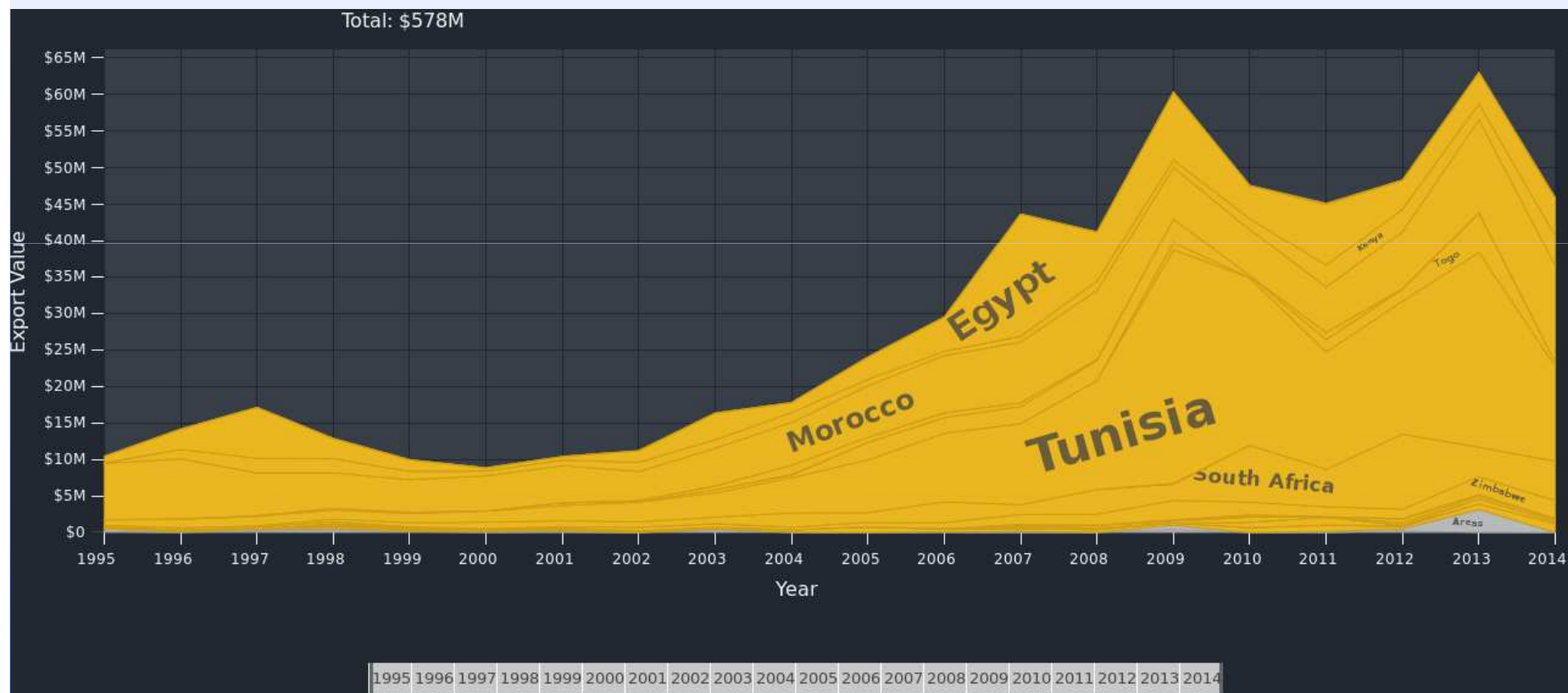
Which African countries import raw gypsum?



Which countries export raw gypsum?



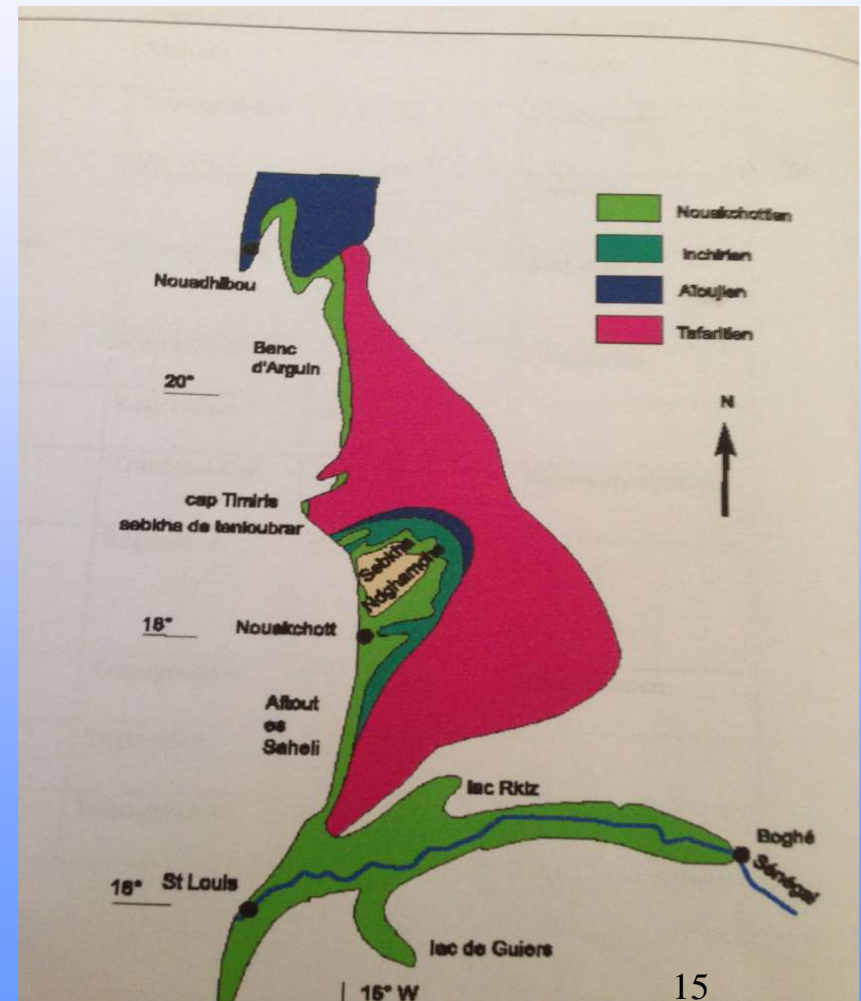
Which African countries raw export gypsum?



2. GYPSUM IN MAURITANIA : RESOURCES, USES, MARKETS, PLAYERS, ETC...

2. Gypsum in Mauritania: Resources

- ❖ Discovered in the 1950s, 50 km Northeast of Nouakchott in a saline basin called *Sebkha Ndagmecha*
- ❖ Gypsum occurs over an area approx. 80 km long and 50 km wide.
- ❖ Gypsum is found :
 - ❖ **on the surface** : as a form of sand dunes and selenite crystals (size: 1-15cm)
 - ❖ **below the surface** as a form of varved or banded gypsum with some impurities mostly clay.



Source : Ould Wessat. 1997

2. Gypsum in Mauritania: Resources

- ❖ Exploitation started in the 80s by SAMIA.
- ❖ Varved gypsum deposits estim. to about 1.7 billion tons. Purity: 70-97 %.
- ❖ Sand dune gypsum deposits are approxi. 50 million tons. Purity: 80 - 95 %.
- ❖ The highly pure crystalline gypsum deposits are about 7 million tons. Purity: > 99 %.

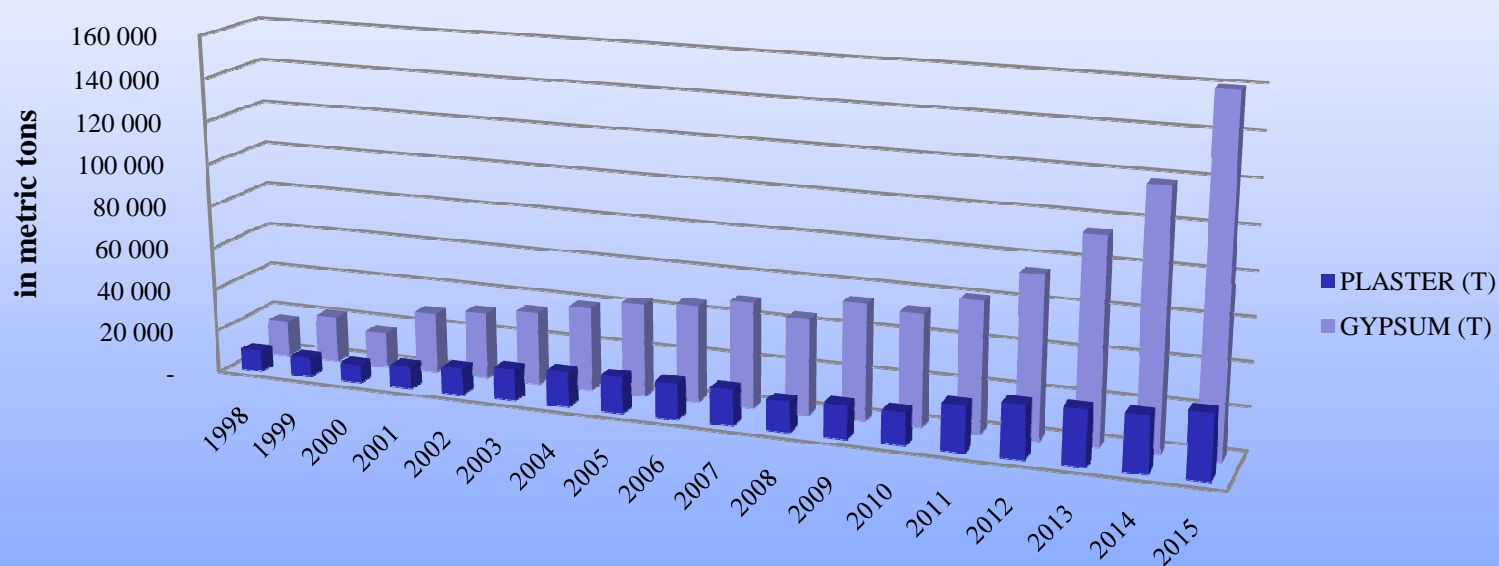


Source : Ould Wessat. 1997

Source : SAMIA.

2. Gypsum in Mauritania: Production

**Mauritania's gypsum and plaster production
(1998-2015)**



2. Gypsum in Mauritania: markets

- Market Segmentation by activity :
 - Building construction (Plaster of Paris) : 20%
 - Cement : 80%
- Geographical segmentation of gypsum market:
 - Mauritania: 50%
 - Export to neighbouring countries (Mali, Senegal): 50%
- Players : 3
 - SAMIA,
 - SOMIP,
 - MAMCO



The Arab Company for Metallurgical Industries

- Created in 1974
- Started production in 1985
- Current Shareholders :
 - Industrial Bank of Kuwait : 50%
 - SNIM : 50%.
- Main activities :
 1. Prospection, extraction and sale of gypsum
 2. Production and sale of Paster of Paris.

SAMIA's Products

- Gypsum
- Plaster of Paris
- Coatings for interior walls
- Coatings for external walls
- School chalk
- Plaster bricks



GYPSUM QUARRY 50 Km from the Port of NOUAKCHOTT (AKJOUJT road)



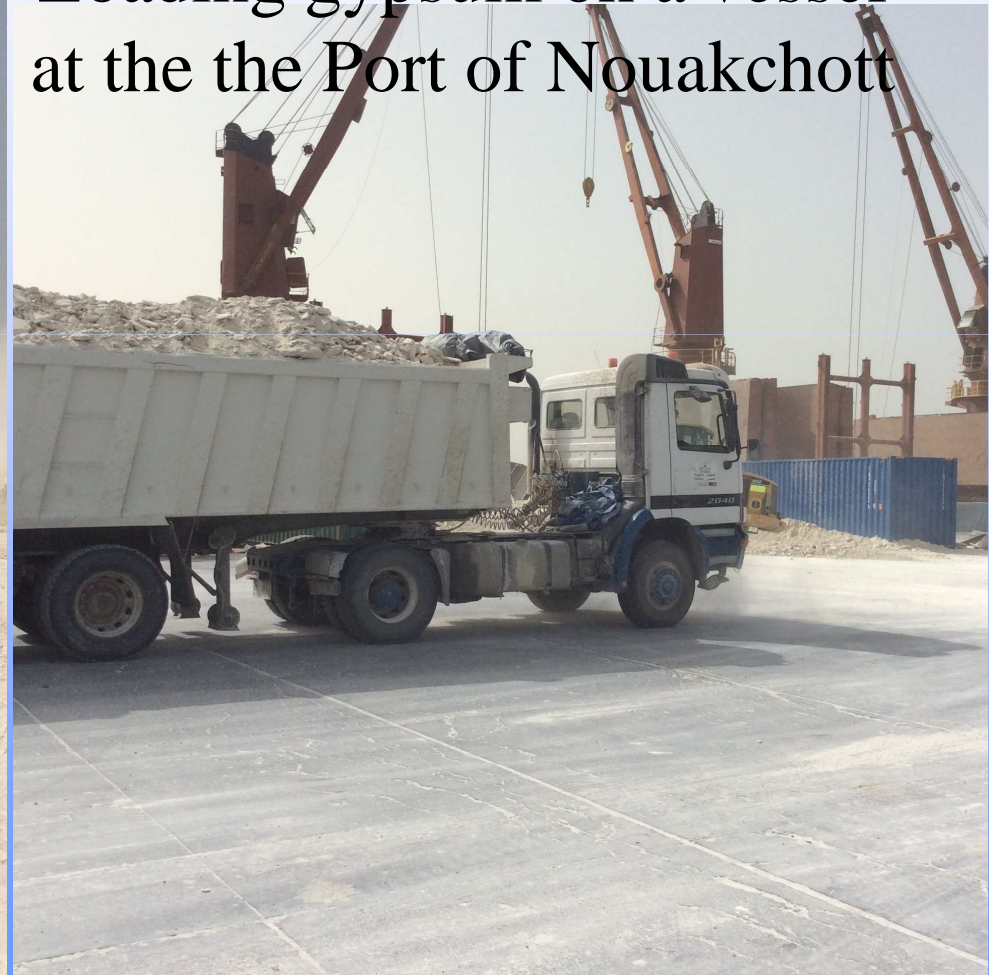
Plaster Production Plant



Gypsum storage area in the Port



Loading gypsum on a vessel
at the the Port of Nouakchott



**3. MAURITANIA EXPERIENCE AS A BULK
GYPSUM EXPORTER :
A LITTLE BIT OF HISTORY
LESSONS LEARNED
OPPORTUNITIES
CHALLENGES**

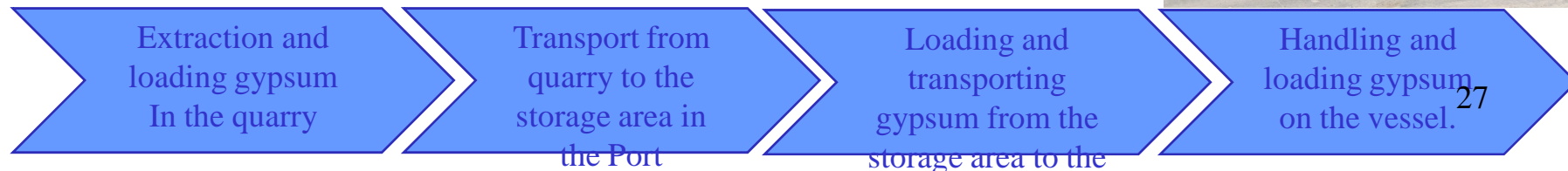
3. Mauritania's experience as a bulk gypsum exporter : a little bit of history

- In the 90s, SAMIA attempted to export gypsum through the Port of Nouakchott but couldn't.
- Its attempt in the 90s to export it by trucks to Senegal was also short-lived.
- With the opening of a new cement plant in Mali, a successful export operation by trucks was carried out by SAMIA in 2012. Since then about 100 000 MT of gypsum was transported by trucks from our quarry to DCM Cement plants in Mali (Bamako and Kayes).
- In 2013, SAMIA started a project to export gypsum in bulk from the Port of Nouakchott to West African countries.
- In Dec. 2015, the first vessel loaded with 35000 MT of gypsum departed the Port of Nouakchott to the port of Dakar.
- **It was the first major export operation of bulk products from the Port of Nouakchott.**



3. Mauritania's experience as a bulk gypsum exporter : lessons learned

1. Good planning and perseverance are the key to success.
2. It is all about price: every ouguiya counts.
3. Know well your market : West Africa Cement Industry is well consolidated with global and regional players. Potential clients are sometimes our competitors . They are themselves gypsum suppliers.
4. Get support from the Government, Port authorities, etc...
5. Optimise the whole supply chain (from the quarry to the Port and beyond).



3. Mauritania's as a potential major gypsum exporter to West Africa : Opportunities.

1. Cement consumption in Africa is growing fast. Expected to reach 62 million MT in 2016.
2. Demand on gypsum is thus on the rise: 3 million tons/yr in 2016.
3. As a cement additive, there no substitute for gypsum;
4. There is no gypsum deposits in all West Africa region. All gypsum consumed is currently imported.
5. In 2014. Africa imports in gypsum and plasters reached USD200 million.
6. Mauritania has many advantages: Geographical location, Quality of its gypsum, gypsum reserves, etc...But there also many challenges ahead.



An other Opportunity is mass production of gypsum for agricultural uses and its export to West African Markets.

There are three general uses of gypsum in agricultural applications:

- A source of nutrients for plants (calcium and sulfur).
- Improvement of soil physical and chemical properties.
- Reduction in the transport of nutrients, sediment, pesticides and other contaminants to surface waters.
- **Gypsum can help remediate sodic (high sodium) soils and polluted soils. A problem encountered by many African countries including Mauritania.**
- Examples of local crops where gypsum can be used : rice, sorghum, wheat, peanut, tomato, potato, sugar beet, cotton.
- Application : 10-20 MT/ha.
- A sizeable market.





Gypsum application



Gypsum application



Untreated soil



Soil treated with gypsum

Mauritania's as a potential major gypsum exporter to West Africa : Challenges.

1. Market Entry: « It is a closed club. Need to have a membership card ».
2. Building Awareness towards potential clients, decision makers, etc...
3. Finding reliable partners.
4. Competition from Global Traders.
5. Port infrastructure and facilities : vessel size, loading rate, waiting time, labor issues, taxes and duties, etc.
6. Outbound Logistics (Inland transportation, storage, handling, shiploading, etc...).
7. Finding financial resources.
8. Regulations : no national regulations for bulk shipping.

4. Conclusions and recommendations

- ❖ Mauritania has enormous deposits of highly pure gypsum that are still largely underexploited.
- ❖ The nature and location of the gypsum quarries make it possible to supply gypsum to the growing cement industry in West Africa.
- ❖ Successful export operations carried out by SAMIA allowed the country to enter the club of gypsum exporting countries.
- ❖ **Yes. Mauritania can become a major gypsum exporter to West Africa and Latin America.**
- ❖ However, there are some issues that need to be addressed first.

4. Conclusions and recommendations

❖ In the short run :

- ❖ Regulate the gypsum licensing. Limit it to few players.
- ❖ Give the exclusivity of gypsum export to one company: SAMIA.
- ❖ Reduce some taxes and duties within the Port.
- ❖ Help SAMIA secure financing to invest in outbound logistics (i.e. inland transportation and shiploading means, etc..).
- ❖ Give incentives to export , allocate storage area inside the Port to bulk products, invest in bulk loading facilities,etc.

❖ In the medium and long run :

- ❖ To reduce and become more competitive, build area/facilities dedicated only for bulk shipping at the PANPA or TANIT Port?
- ❖ To further reduce cost and ensure an economy of scale, build a railroad system that relate gypsum and salt quarries to the Port of Nouakchott.
- ❖ Promote gypsum and include it in the trade agreements that our country will sign with ECOWAS countries.

THANK YOU !