

BUILDING UP THE GREEK HYDROGEN VALUE CHAIN



**KAVALA
FERTILIZERS
LTD**



**The Greek
fertilizers
experience: green
H₂ production and
consumption**



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Grades of Hydrogen

➤ **Hydrogen Production**

i. grey

ii. blue

iii. green

➤ **Uses of Hydrogen**

a. for NH₃ production used as raw material for Fertilizers

b. energy carrier

KAVALA FERTILIZERS as an historical Hydrogen producer

Industrial complex in NEA KARVALI KAVALA produces

H₂/NH₃ since 1964.

Initially NH₃ production based on oil and since 1988 based on NG (grey ammonia)

The company has facilities for loading and unloading NH₃ from ships as well as storage liquid NH₃

FERTILIZERS sector as a H₂/NH₃ consumer

Fertilizers sector is

- **a traditional one** (first decades of 19th century)
- **always revamped and renovated** towards the sustainability
- **related to GHG emissions** (belongs to sectors exposed to CL)
- **invests in decreasing GHG emissions** at the minimum level
(reduction of more than 40% since 2005)
- **considered a key stakeholder in the food chain**

Green Hydrogen/Ammonia revolution

Green ammonia is the future of our industry and is not just important for green fertilizers, but also as fuel for deep-sea shipping and as energy-carrier for hydrogen.

Although, this goal is really a revolution.

Green Hydrogen/Ammonia revolution

Green Hydrogen/Ammonia production is very complicated and needs a systemic approach for Fertilizers Industry movement towards the sustainability.

- no well-known technology for an industrial production
- necessity to secure the continuity of the production
- necessity to change the national infrastructures
- development of specific safety and environmental protocols
- legal provisions to be adopted from the member states
- Certification scheme of Hydrogen/Ammonia is necessary to enable producers to have a green premium on their product.

Greek fertilizers production based on green Hydrogen

If an infrastructure to import and transport green H₂ is installed then green NH₃ could be produced.

But

High CAPEX and OPEX of green ammonia production could be a limitative parameter for Fertilizers production.

NH₃ represents the 60-80 % of the Fertilizers cost

Another option could be the blue ammonia either proceeding with offset of the CO₂ emissions by Green Houses installation or with a project of Carbon Capture.

Green Hydrogen Chain: Subjects for further consideration

- ✓ **Do we need pure Hydrogen?**
- ✓ **How to evaluate the access to other sources (water and renewable electricity) used for green H₂ production?**
- ✓ **What infrastructure we need (pipeline of pure H₂, electrical interconnection)?**
- ✓ **Do we need a certification scheme for green or blue H₂?**
- ✓ **Do we need carbon dioxide for other uses? CF case in UK, urea production**

The future of green Hydrogen in the Greek Energy Market is under investigation

Universities and Engineering companies could evaluate the Greek Case of transition to green H₂ production and consumption and propose a global most appropriate solution according to technical and economic criteria.

- 1. The need for green H₂ production exists**
- 2. The need of H₂ consumption is known**
- 3. The infrastructure to support the effective process has to be identified**
- 4. The implementation of the process has to be supported and founded by EE and Greek Government**

THANK YOU

QUESTIONS ?

