

# ANDREAH project, membrane reactors for ammonia decomposition

S. Scoppa<sup>1\*</sup>, J.L. Viviente<sup>2</sup>, A.M. Thomas<sup>2</sup>, F. Gallucci<sup>3</sup>

<sup>1</sup> CUBE B.V., Heipolderstraat 2, Heeze, The Netherlands, (\*) [simona.1cube@gmail.com](mailto:simona.1cube@gmail.com)

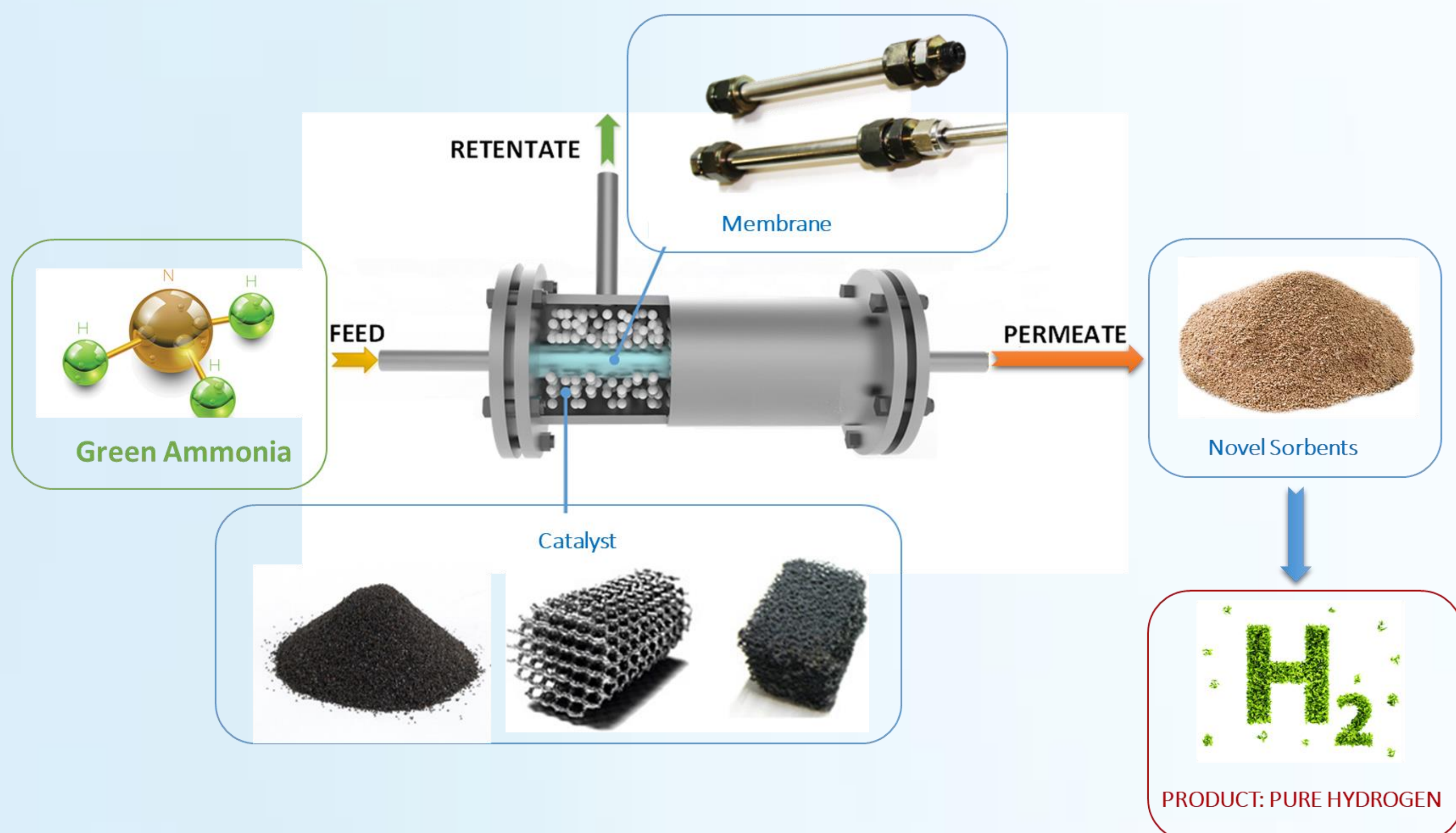
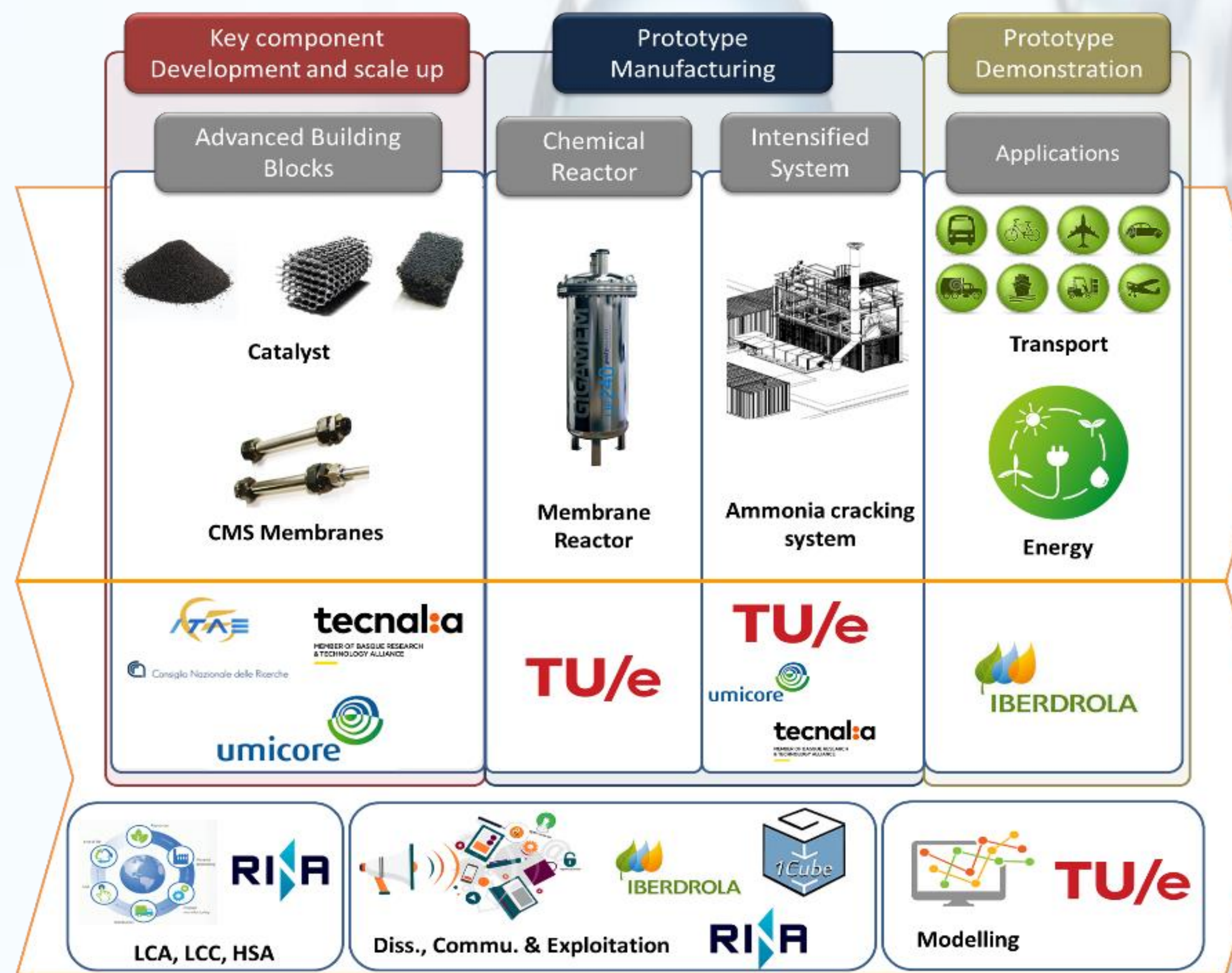
<sup>2</sup> TECNALIA, Basque Research and Technology Alliance (BRTA), Mikeletegi Pasealekua 2, 20009, Donostia-San Sebastian, Spain

<sup>3</sup> Inorganic Membrane and Membrane Reactors, Sustainable Process Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands

ANDREAH's main objective is to provide a quantum leap in the development of advanced NH<sub>3</sub> cracking to produce ultra-pure H<sub>2</sub> (>99.998%) by developing an innovative system, based on a Catalytic Membrane Reactor (CMR) for the cracking of Ammonia, positioning Europe as a reference in this field and significantly promoting the deployment of the hydrogen economy in the EU.

In this way, optimised heat management, improved conversion per pass and purification/recycling for more cost-efficient and resource-effective ammonia decomposition at lower temperatures (400-450 °C) will be achieved.

The development of new catalysts and carbon membranes integrated into CRM will provide huge process intensification enabling the distributed generation of H<sub>2</sub> from NH<sub>3</sub> as long-term storage and energy carrier for long distances transportation and thus, new associated business opportunities will emerge, e.g. for use in hydrogen refuelling stations or as backup for refineries or steel industries, where it is more efficient to store hydrogen in the form of ammonia and to operate a cracking system for the production of the required H<sub>2</sub>.



ANDREAH is divided in the following specific targets:

- To develop and demonstrate at 10kgH<sub>2</sub>/day scale, a new Intensified ammonia cracking system based on Catalytic membrane Reactor Technology through advanced Carbon Molecular Sieve Membranes integrated with Novel Catalyst.
  - ✓ To develop an innovative, environmentally friendly and with less critical materials, structured catalyst that can be used at much lower temperatures compared to state of the art process.
  - ✓ To develop innovative membranes for selective separation of H<sub>2</sub> during production process.
  - ✓ To develop novel sorbents for polishing the H<sub>2</sub> recovered by the membranes
- To develop a full LCA, LCC and Health and Safety Analysis (HSE) of ANDREAH
- To pave the way for future exploitation of ANDREAH Key Exploitable results

