Emergy

Turning Green Transition into Practice – Exploring Green NH3 production in Romania

Study Results Presentation

Mar 2025

Emergy at a glance

Strong footprint in the energy market in South-Eastern Europe

Key facts

- **Renewable energy developer** specialized in advancing greenfield and early-stage projects up to **Ready-to-Build (RTB) status**
- **Founded in 2004**, developed and constructed 3 windfarms (150 MW) in China back in 2010
- Developed and constructed **246 MW wind power in Ukraine** 2021
- Successfully **divested 168 MW in Serbia** 2024
- Ambition to develop **~450 MW ready to build (RtB)** projects every year

Portfolio: ~ 2 GW under development

Serbia

- Joint Venture with WV-International, a local developer with extensive local insight
- 168 MW divested in Q424
- Remaining portfolio of 6 projects with total capacity of ~700 MW

Romania

- 2 projects with total capacity of ~700 MW
- Local team and office in Bucharest
- Green Hydrogen and Ammonia project with Innovation Norway and Linde

Greece

- Co-development with local partner RES Invest
- 3 projects with total capacity of ~185 MW
- 24 MW ready to build mid 2025

Ukraine

- Holding 5 projects with total capacity of ~1,000 MW
- Reached RTB for ~400 MW before the breakout of the war
- Awarded ~3 mEUR in grants from Norad in 2024

Our project supported by Innovation Norway

Exploring potential for Green Hydrogen & Ammonia

Emergy & Linde Gas

- **Emergy and Linde Gas** are exploring the opportunity of **green H_2 production**
- **Innovation Norway** granted support in July 2024 to explore green H_2 & NH_3 production and its market potential

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Linde

Innovation Norway

Strategic importance

- The project is **aligned with the EU's Green Deal, Fit for 55, and CBAM** regulations
- Green hydrogen and green ammonia are **key enablers of carbon neutrality**, offering solutions across multiple sectors
- Potential to enhance **Romania's energy independence,** reducing reliance on imported fossil fuels and position it as a **regional leader**

Project objectives

- Explore the market for **green- hydrogen and ammonia** as a **sustainable alternative** to fossil fuel.
- **Evaluate market feasibility** for using ammonia in**:**
  - Refrigeration
  - Agriculture
  - Off-grid energy storage
- **Increase stakeholder engagement** as part of Emergy's best-practices on E&S work
  - **Assess local needs** among key stakeholders in the region
  - **Inform and involve** farmers and community members
  - **Create awareness** of the potential and use cases for sustainable alternatives (green H_2 & NH_3)

Green energy to produce sustainable alternatives to fossil fuels

Water electrolysis: $2H_2O \rightarrow 2H_2 + O_2$

Haber-Bosch process: $N_2 + 3H_2 \rightarrow 2NH_3$

Case studies for green ammonia

Impact

1 Refrigerant
(Romania & Bulgaria)

- Alignment with **EU environmental regulations** (F-Gas Regulation, Net Zero Industry Act) by **replacing hydrofluorocarbons** (HFCs)
- **Reduces GHG emissions** and operational energy costs while ensuring compliance with EU climate mandates
- Advanced ammonia refrigeration technologies **improve energy efficiency**, reducing energy consumption by 15-20%

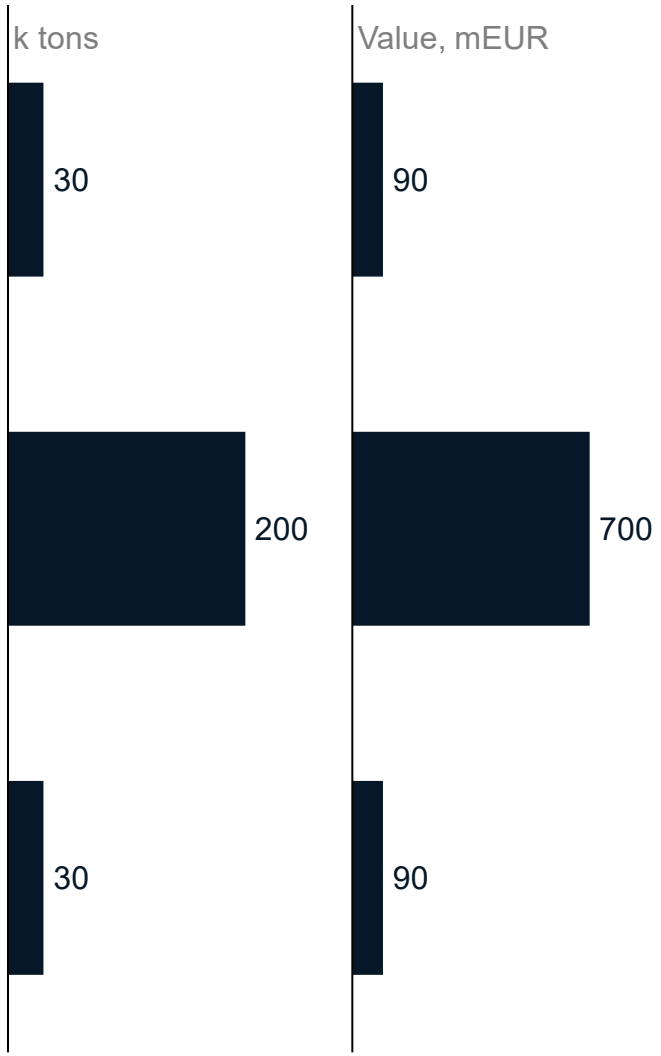
2 Agriculture

- Supports the **EU Green Deal and Farm to Fork Strategy** by replacing conventional fertilizers, improving nitrogen use efficiency
- Attractive and growing market, however there are **significant technical limitations and challenges** to enable its full potential
- Advanced synthesis processes such as the Linde Ammonia Concept (LAC™) optimize **production efficiency** and reduce energy consumption

3 Off-grid e-chargers
(Romania & Bulgaria)

- Supports Romania's hydrogen roadmap by providing **off-grid charging solutions** in remote areas while reducing emissions
- Addresses the lack of traditional energy infrastructure in underserved regions, **promoting EV adoption**
- Ammonia cracking technologies enable **localized hydrogen production** for EV chargers

Total Market Potential (Annual)



Emergy’s ESG approach

Stakeholder Engagement plan is a critical component, especially for large infrastructure projects

Our approach for Stakeholder Engagement:

- Multiple live meetings with **local authorities, community members** and **farmers** to:
  - Give every stakeholder a **voice** and opportunity for **engagement**
  - Create **increased awareness** and **sharing of information** with local government and regulatory bodies
- **Stakeholders Needs Assessment** by professional group of social specialists to determine community development needs

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Sustainable stories.

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