



## AICHE conference Ammonia Fuel Sessions

Minneapolis, November 2017



**And here she is .....**

# MONIA

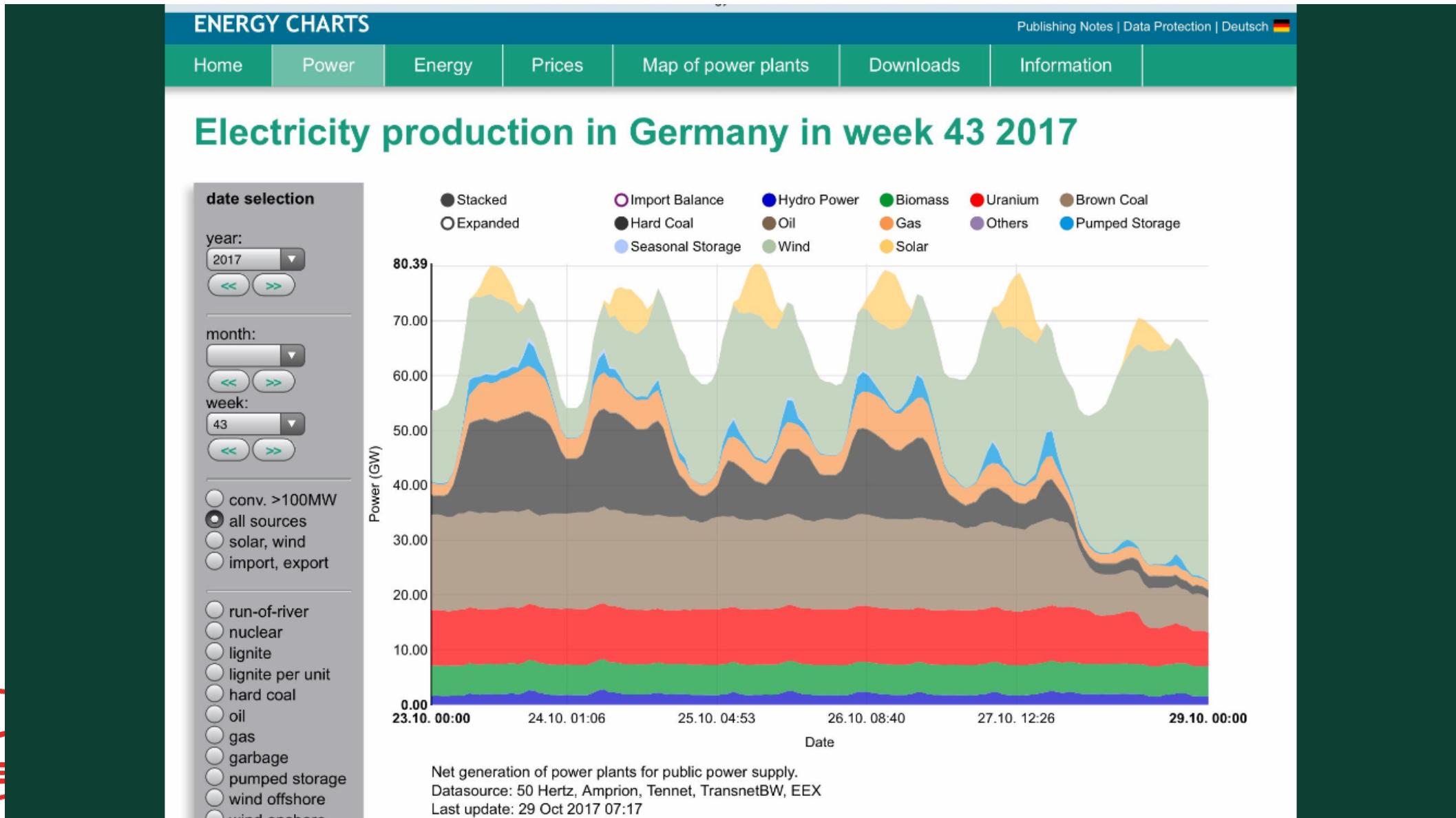
The Mascotte for Mini-ammonia



PROTON  
VENTURES

[www.protonventures.com](http://www.protonventures.com)

# Historic news: App 60% power from wind in Germany for a full day, with negative pricing for a day!!!





Ammonia4fuel in RTL-Z  
Dutch television program  
“doe maar duurzaam”

With lots of hits on twitter and  
linked-in

Link will be given later for  
YouTube

## Ammonia in the news in the latest governemental act 2017-2022





## Empowering Storage Solutions Unique Ammonia Portfolio



### Our Activities

### Our Work

#### STORAGE



NH3 HCL

#### SERVICES

Engineering, Commissioning, Start up,  
Training, Operations, Maintenance



### PRODUCTION Small Scale Ammonia (NFUEL)

Unit	Kg/hr	MTD	ktpa
NFUEL 1	120	3	1.000
NFUEL 4	415	10	3.650
NFUEL20	2500	48-60	20.000

### Our Company

20 EMPLOYEES



Speaking more than 6 languages

10 ENGINEERS

Process, Mechanical, E&I



3 OFFICES

Netherlands (headquarter),  
USA, Estonia



PARTNERSHIP

with Vicoma



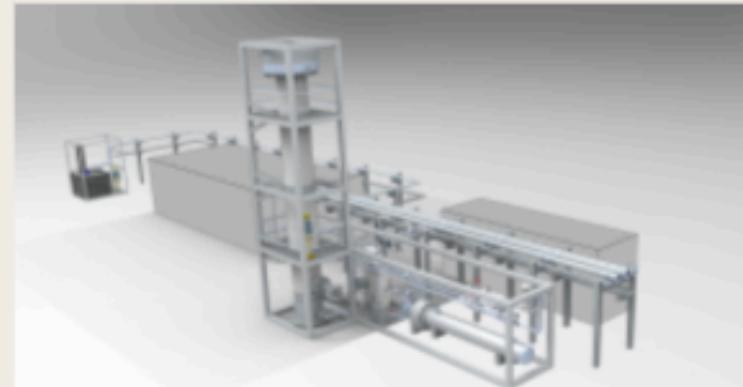
NH3 event  
2017

### Development

ORGANISER 1st European Power-to-Ammonia  
Conference

LECTURES by International Fertilizer Society (IFS),

Energy Storage, NH3 Event USA and more



# Proton's Management team



**Geir Wedde**

**Proton Ventures BV Sales Director**

- 30 years of experience as technology manager
- Entrepreneur / Owner of Norwegian Neatec – Air Pollution Control Technology



**Hans Vrijenhoef**

**Proton Ventures BV Founder / CEO**

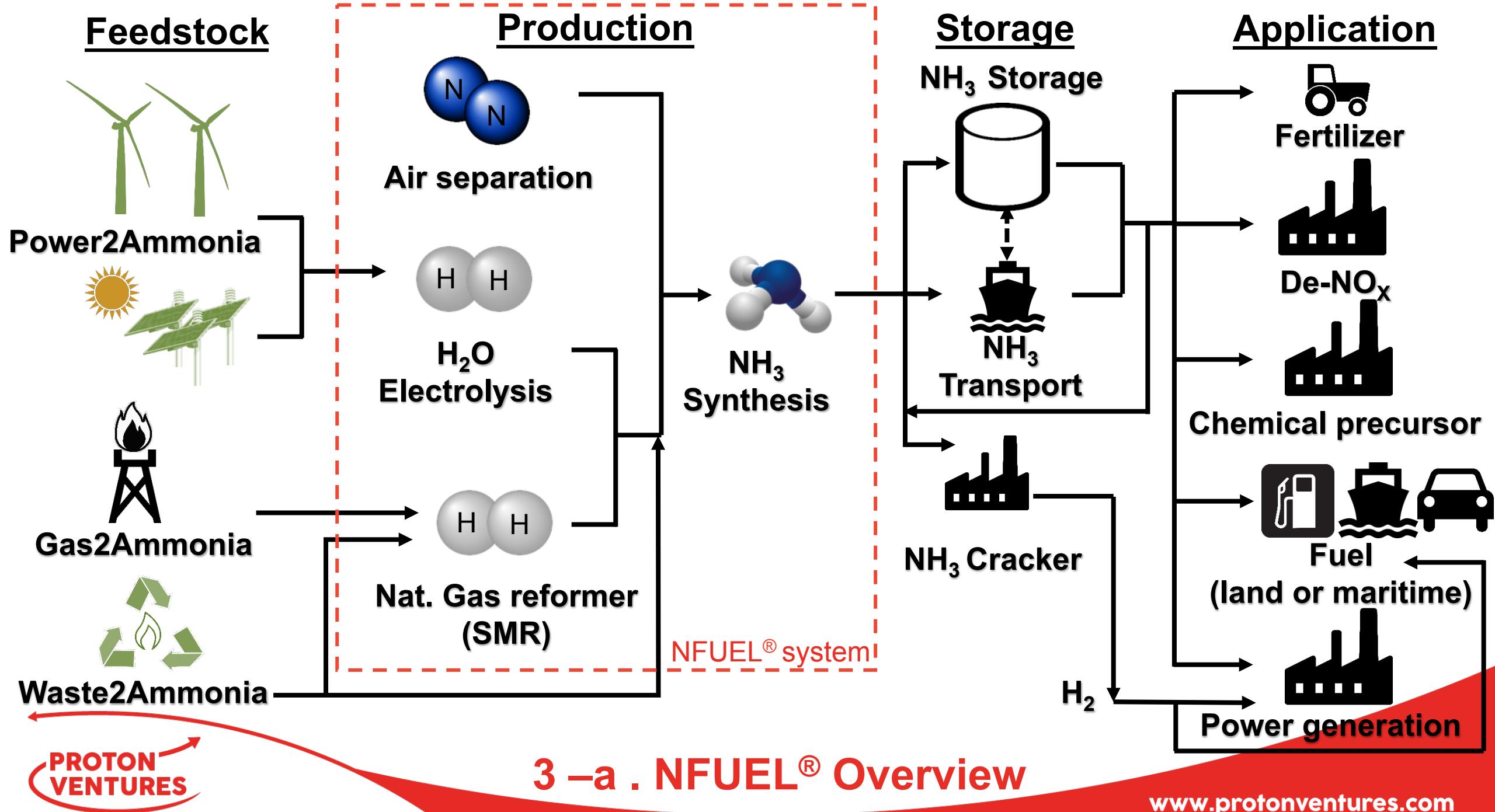
- 25 years of experience in ammonia and fertilizers business
- Ammonia plant manager for Kemira Rozenburg
- Ammonia sales manager for Kemira
- One of the first visionaries of mini ammonia units concept



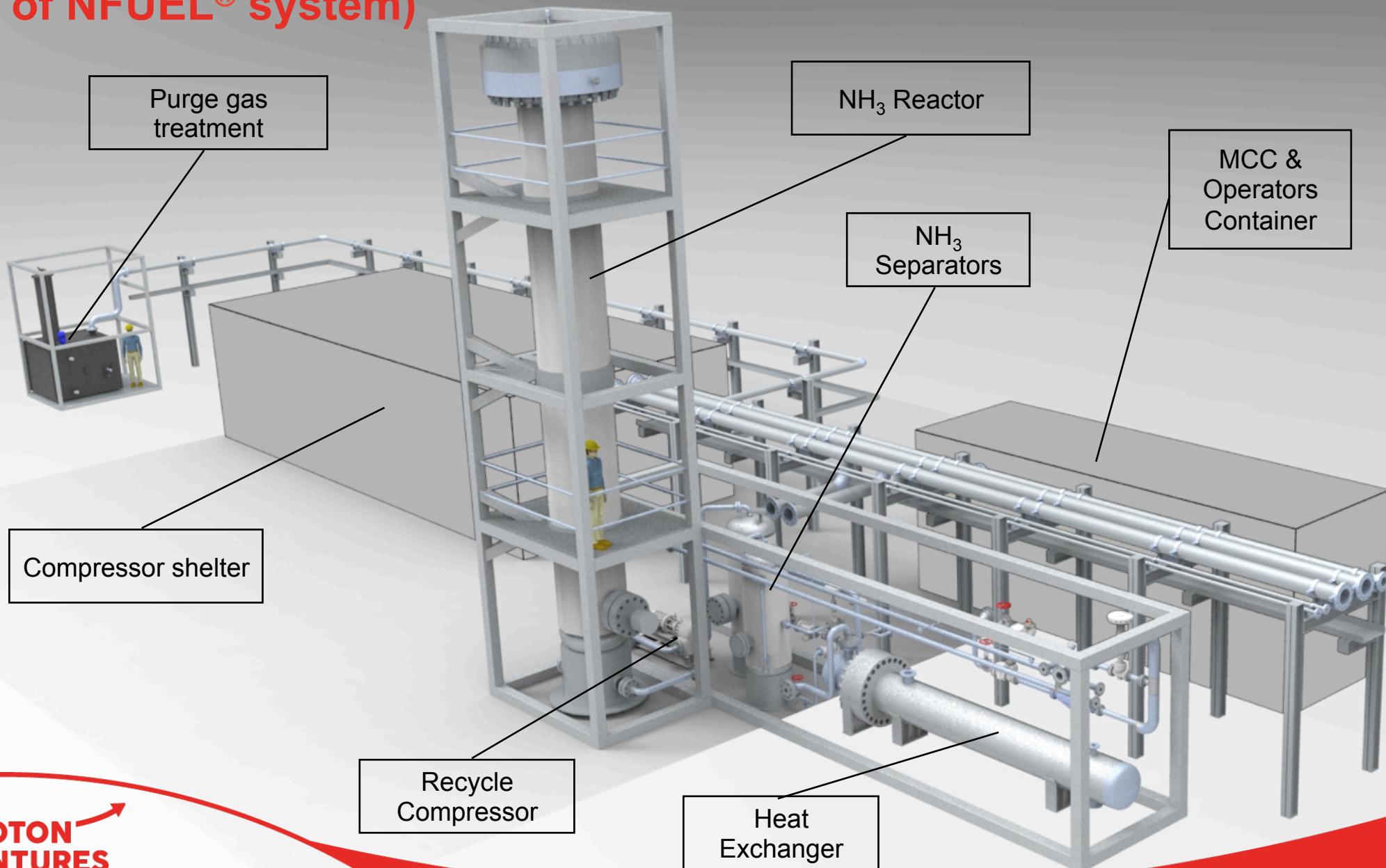
**Ioanna Aslani**

**Proton Ventures BV Operational Director**

- One of the first engineers at Proton
- Been involved in almost all functions in the company
- Guarantees the workload efficiency and quality of the projects



# Proton proprietary ammonia synthesis unit (part of NFUEL® system)



# NFUEL® Technology Summary

- Small Scale Ammonia Production in three capacities:

Unit Size	Kg/hr	Metric tons/day	Metric tons/annum
NFUEL® 1	120	3	1.000
NFUEL® 4	415	10	3.650
NFUEL® 20	2.500	48-60	20.000

- Decentralized production of ammonia:

facilitating customers to be independent of transport costs and fluctuations of the ammonia price.

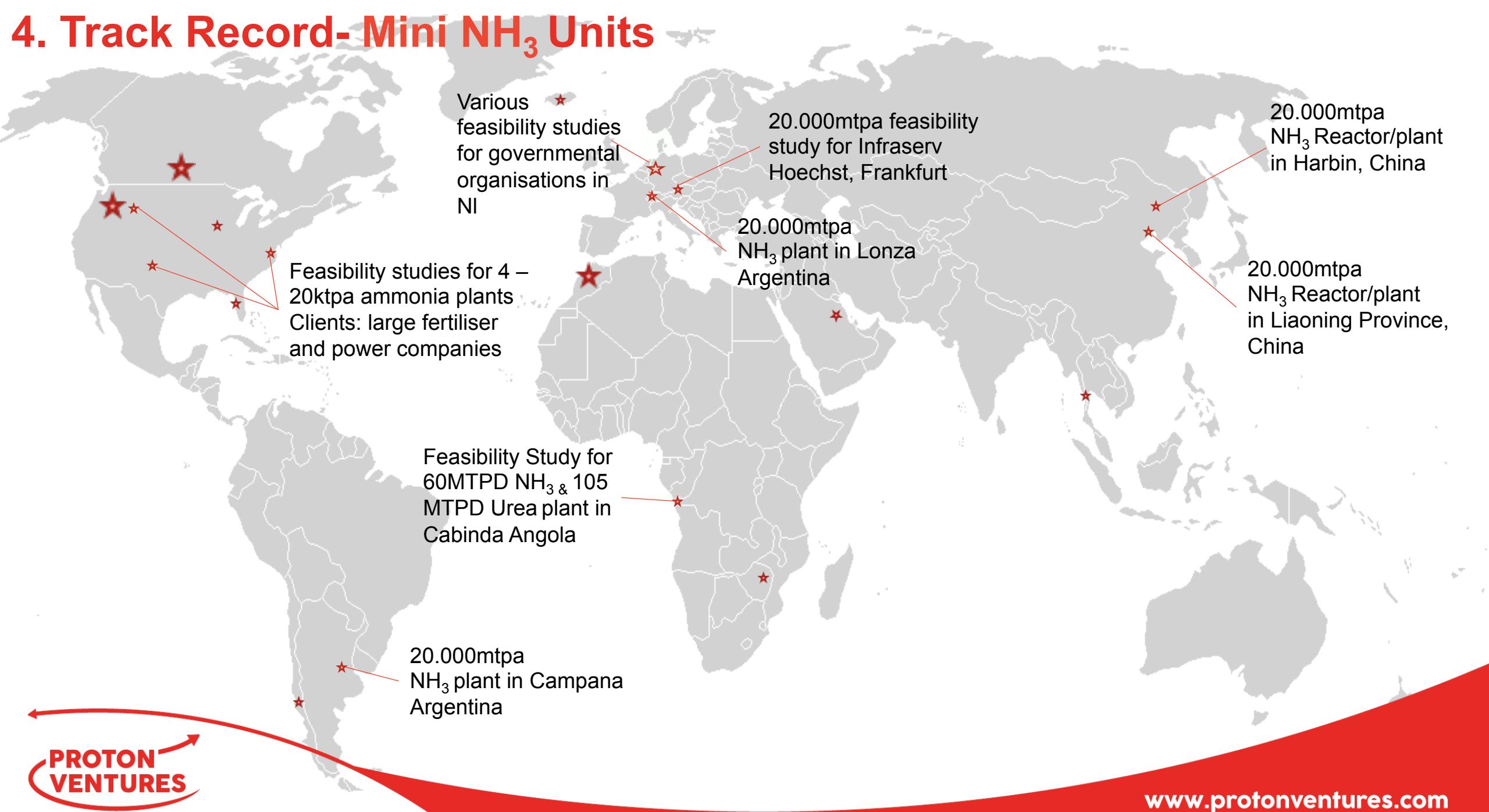
- Three different feedstock sources:

Gas2Ammonia, Power2Ammonia Waste2Ammonia

- Key consumables:

Key Consumables			
Natural gas	835	Nm <sup>3</sup>	Per m-ton NH <sub>3</sub>
H <sub>2</sub>	2.080	Nm <sup>3</sup>	Per m-ton NH <sub>3</sub>
Electricity (when H <sub>2</sub> from NG )	1000	Kwh	Per m-ton NH <sub>3</sub>
Electricity (when H <sub>2</sub> from H <sub>2</sub> O)	11.000	Kwh	Per m-ton NH <sub>3</sub>

#### 4. Track Record- Mini NH<sub>3</sub> Units



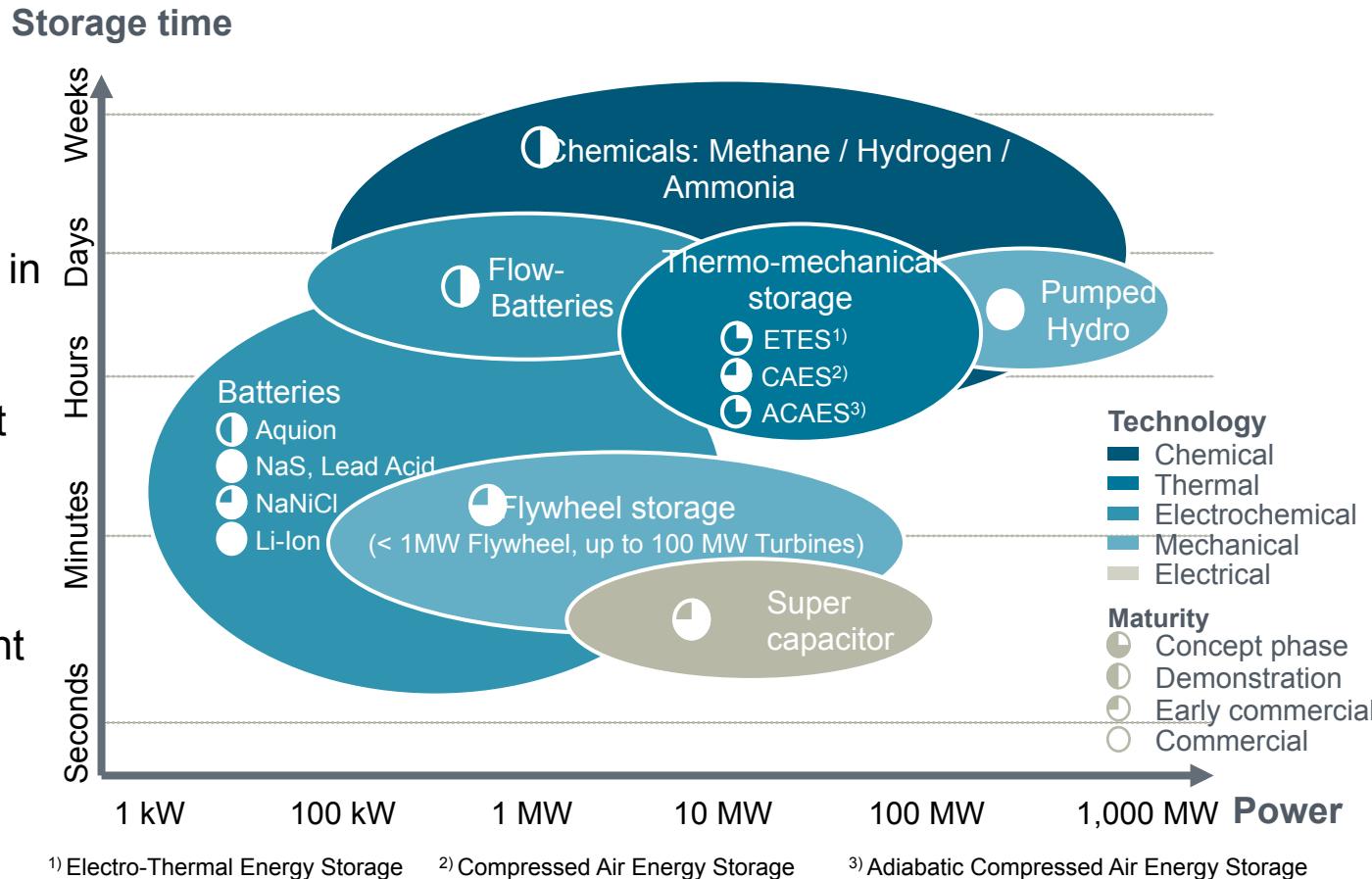
## 6. NFUEL® Innovative Business Case B: NH<sub>3</sub> as an energy storage

NH<sub>3</sub> - ideal green solution for long term energy storage because of:

1. Utilization of **Stranded** sources (eg. Solar, wind, tidal energy)
2. Peak energy saving by **flexibly** producing NH<sub>3</sub> when **excess** available renewable energy cannot be put back in the grid
3. **No** CO<sub>2</sub> emitted when utilising ammonia or producing it from electrolysis
4. NH<sub>3</sub> has a **45% higher** vol. energy density than H<sub>2</sub>
5. NH<sub>3</sub> stored in **inexpensive** pressure vessels (@ ambient conditions of e.g. 20 °C NH<sub>3</sub> is liquid @ 7.6 barg)
6. NH<sub>3</sub> solves the **long term** storage issue as opposed to batteries that self-discharge after a short period of time

( see graph)

**PROTON  
VENTURES**



Source: Siemens presentation, 1st European NH<sub>3</sub> Conference 19/05/2017



Maritime fuel



[rotonventures.com](http://rotonventures.com)

# The next NH3 event in Rotterdam:



2nd European Power to Ammonia® Conference  
May 17 & 18 | 09:30 - 17:00 hours  
Rotterdam | The Netherlands

More information and registration:

[www.nh3event.com](http://www.nh3event.com)



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