

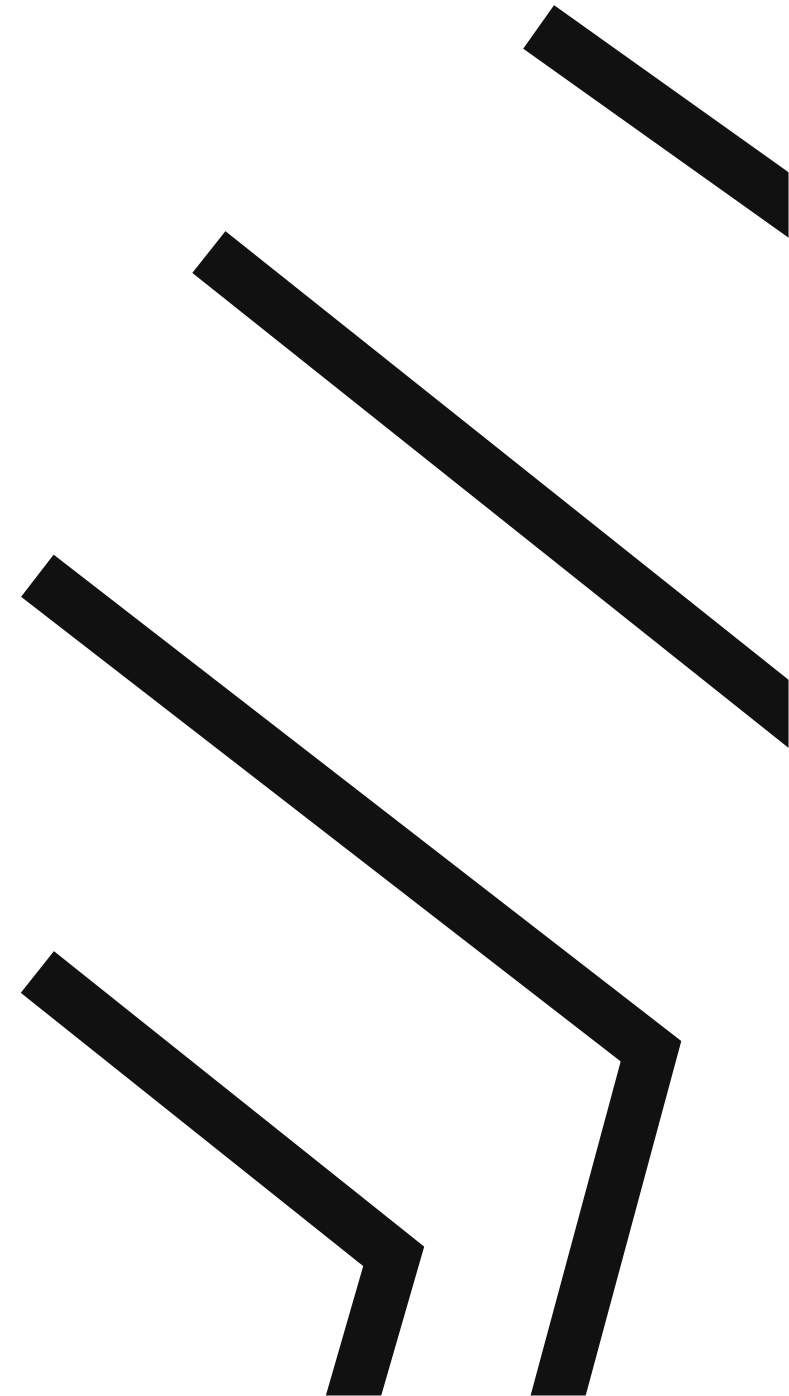


NITIU

Mid Sweden Hydrogen Valley

Energi, flexibilitet & distribution

Teams, 14 december 2023, 0900 - 1100





# Our origin, our mission, and our purpose

NITIU is originally a network, or with modern wording a **think-tank** of **researchers, engineers and entrepreneurs**. Since the start in the 60s, the purpose has been to exchange ideas and challenge status quo. NITIU still operates as **an arena** at the intersection between **academia and industry**.

NITIU is an entity active within the **field of applied physics**. NITIU's core business is to **develop disruptive**, innovative and proprietary **technologies** with the purpose of foremost achieving improved global sustainability.

We maintain core competence in areas such as design, simulations, production technologies and project management. NITIU operates as a **virtual project office** in development projects when in **cooperation with our industrial partners**.

The patented ILS<sup>®</sup>-structure is a novel load bearing structure that significantly increases the **strength to weight ratio** in industrial products and is under development in its first commercial applications within **hydrogen storage** – where higher **gravimetric and volumetric densities** can be achieved compared to existing solutions.

NITIU pioneers' disruptive technology to **address society's most pressing challenges**.

## Hydrogen storage for compressed, liquid or a combination thereof

### Characteristics

- Safe
- Light
- Strong
- Rigid
- Calculable
- Withstand hydrogen
- Fossil free
- Sustainable
- Recyclable
- Green product

### Objectives

- Double safety
- Non-Flammable
- Lighter than EC req.
- More volume efficient than EC req.
- Made from recycled material
- Part of a recycle chain
- Produced in a green process

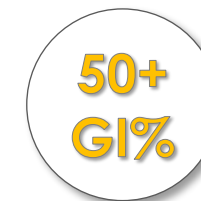
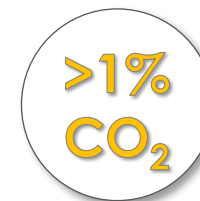
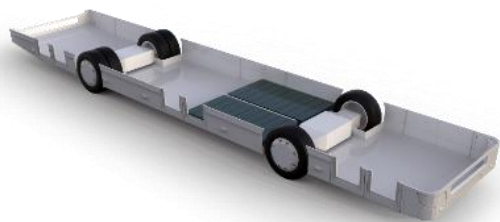
### Results

A hydrogen tank that is conformable or prismatic, featuring dual safety measures capable of withstanding fire. Made from a steel alloy based on recycled steel, lighter and more volume efficient than the specifications outlined by the EC.

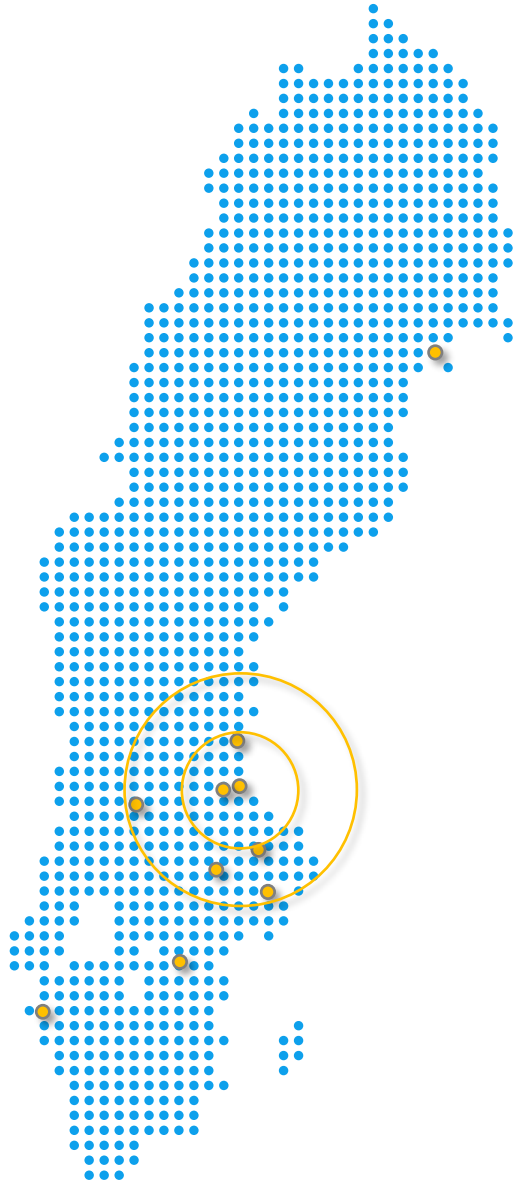
The tank can contain and withhold compressed, liquid or a combination thereof.

The tank is made of recycled steel in a process that is green to 86% and is part of a recycling chain.

Today, the solution has a **GI% of at least 50%**, with **EU call for 35%**. We aim higher.



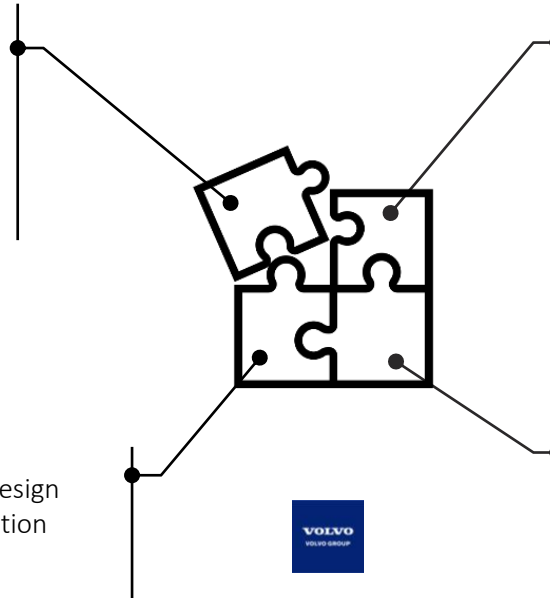
# What we have done, are doing, and want to do.



A patented isotropic  
lightweight  
macrostructure



A combination of design  
principles & calculation  
methods.

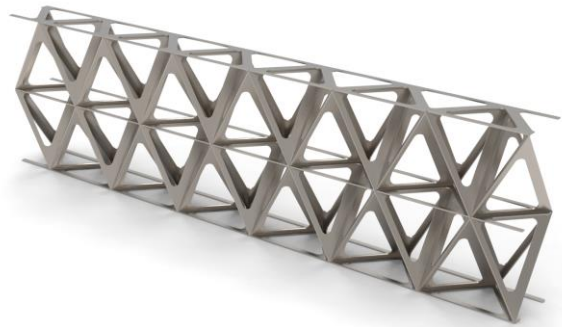


A unique steel with  
extreme tensile  
strength



A unique joining  
method





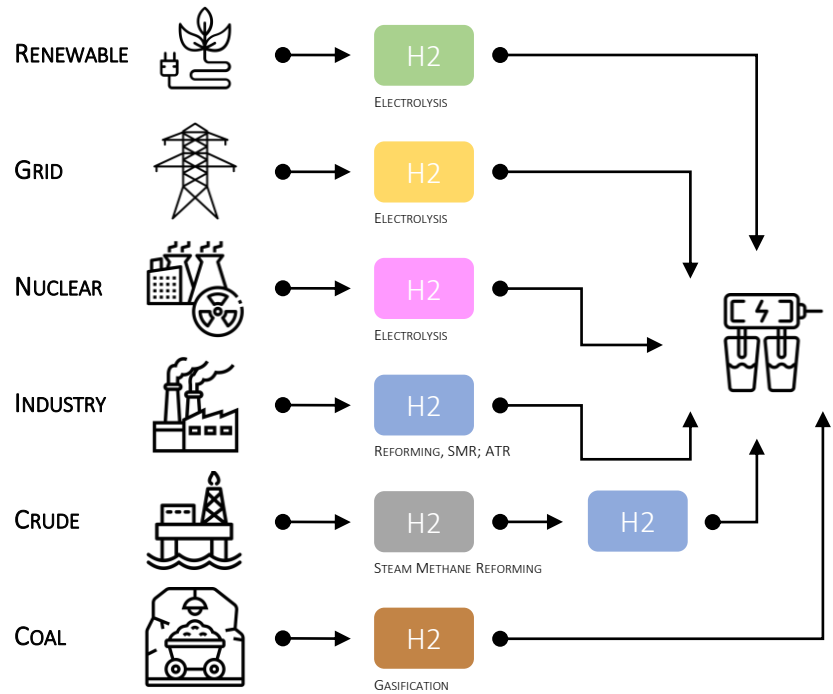
## High Capacity

The system solution allows for transporting 100% more hydrogen per storage unit.

## The Hydrogen Value Chain

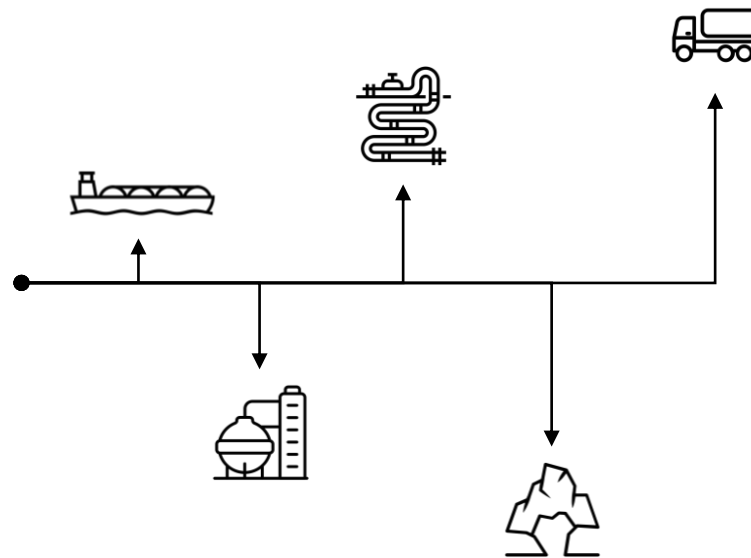
### Hydrogen Production

Hydrogen is produced from various raw materials and through different processes.



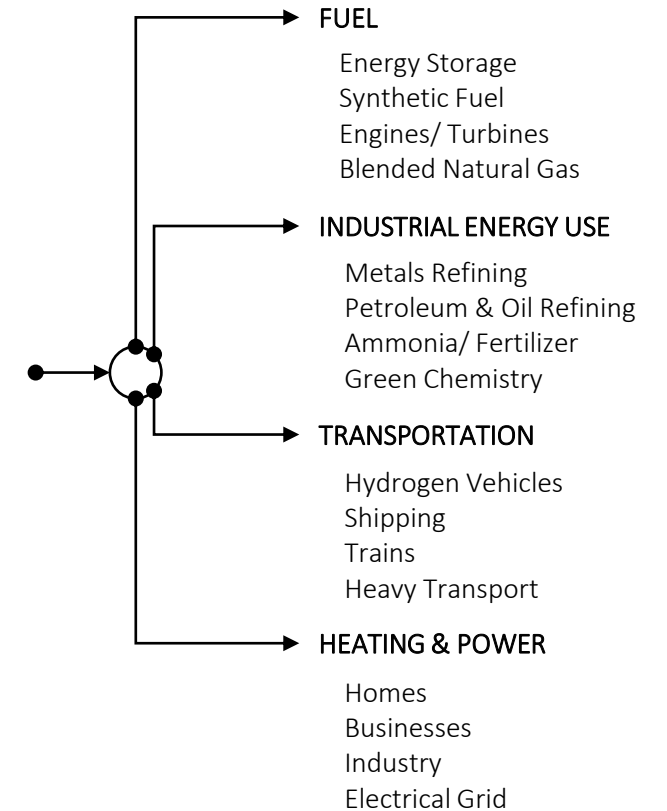
### Hydrogen Transport, Distribution & Storage

Hydrogen is transported, distributed and stored in variety of phases, pressures and formats.

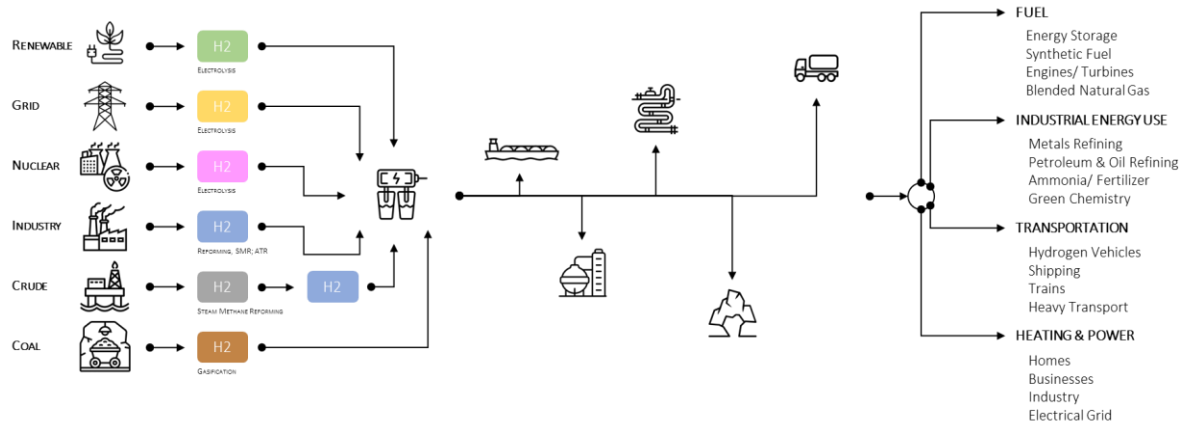


### Hydrogen End Applications

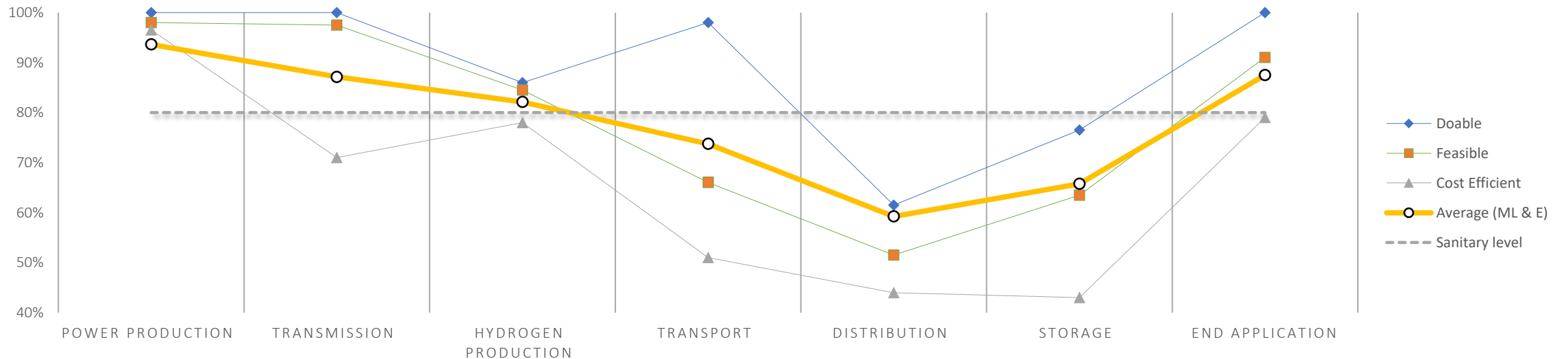
Hydrogen serves as a raw material, energy carrier, or ingredient for a multitude of processes.



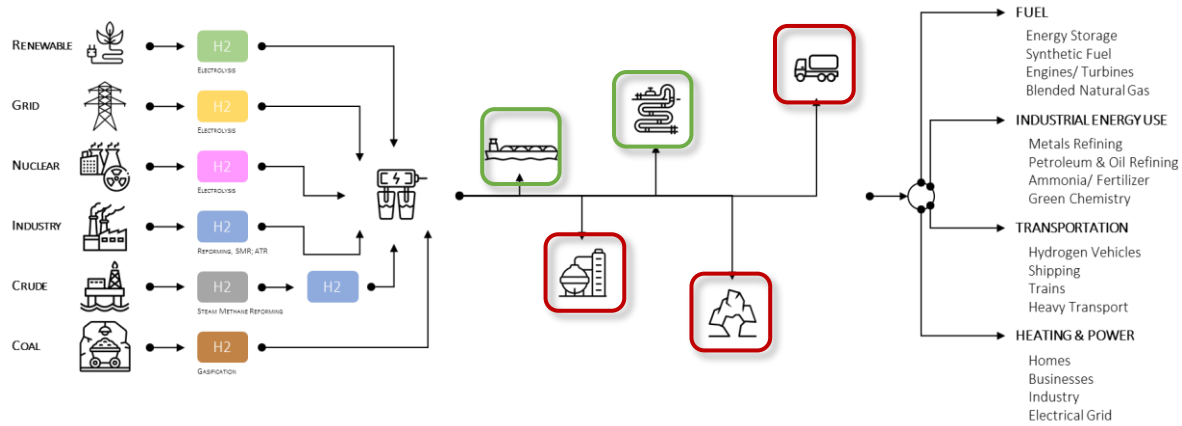
## The Hydrogen Value Chain



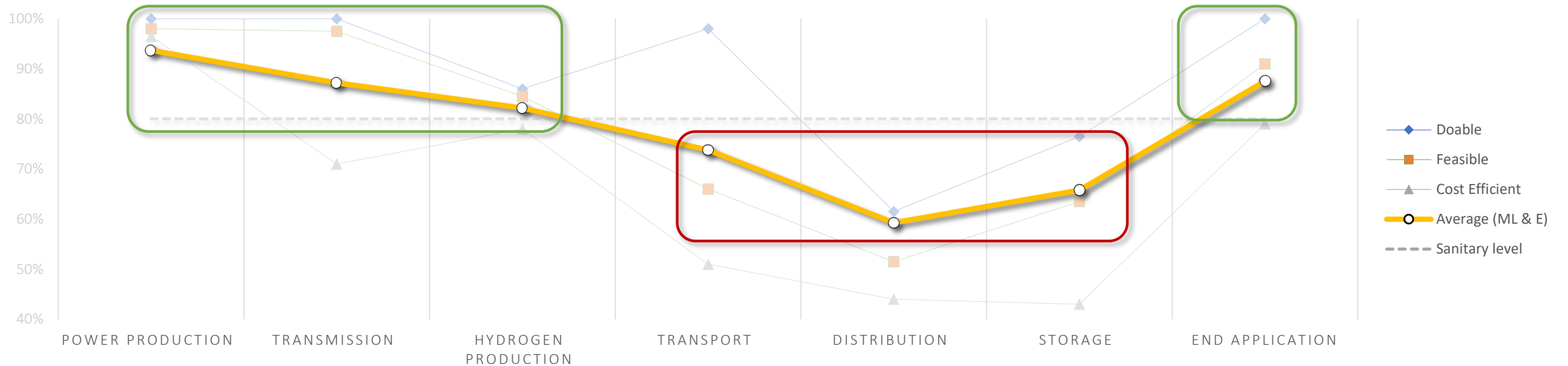
## Maturity Level & Resilience



## The Hydrogen Value Chain



## Maturity Level & Resilience





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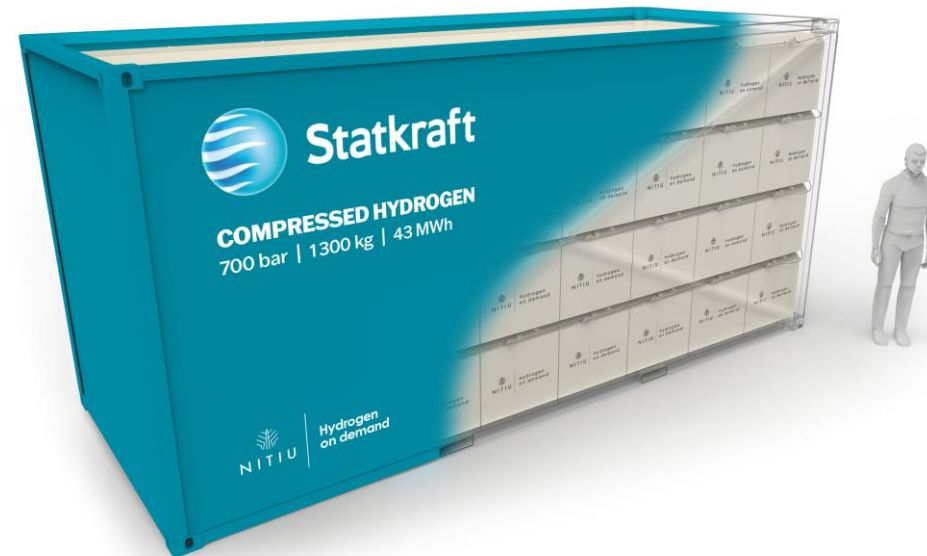


Hydrogen storage for compressed, liquid or a combination thereof



## Advantage

Secure and fire-resistant storage unit that can contain double the amount of hydrogen for the same volume and within the weight restrictions allowed for a container.



## Challenge

Who desires control over the supply chain? The energy company aims to generate power and hydrogen, while a freight forwarder is willing to handle container transportation. The question arises: who ultimately owns the business?



## Cost effective freight

The system solution allows for transporting 300%+ more hydrogen per convoy.

## Larger (Railway) Transport Profile

SECU, Stora Enso Cargo Unit.

It measures 13.8 x 3.6 x 4.4 m.

The payload capacity is 79,500 tons.

NETSS (North European Transport Supply System).

The following ports already have full capacity in terms of handling - Finland (Kotka, Oulu) and Sweden (Gothenburg), Belgium (Zeebrugge), UK (Tilbury, Immingham) and Germany (Lübeck).



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Rail (68 wagons, Malmbanan) – up to 14GWh

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Barge (112 x 108 MWh) – up to 12/24 GWh

## Safe Sub Sea Storage (55 GWh)

LDES (Long Duration Energy Storage)

512 Interchangeable Units



Secure storage in the absence of oxygen  
Minimum safety distance



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