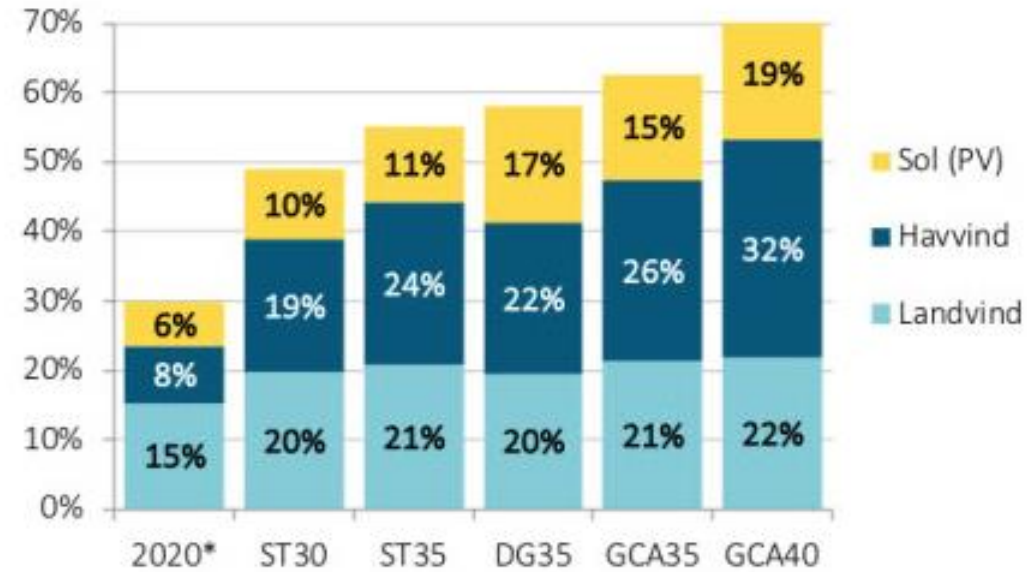


# Electrolysis

- Wind turbines' best friend

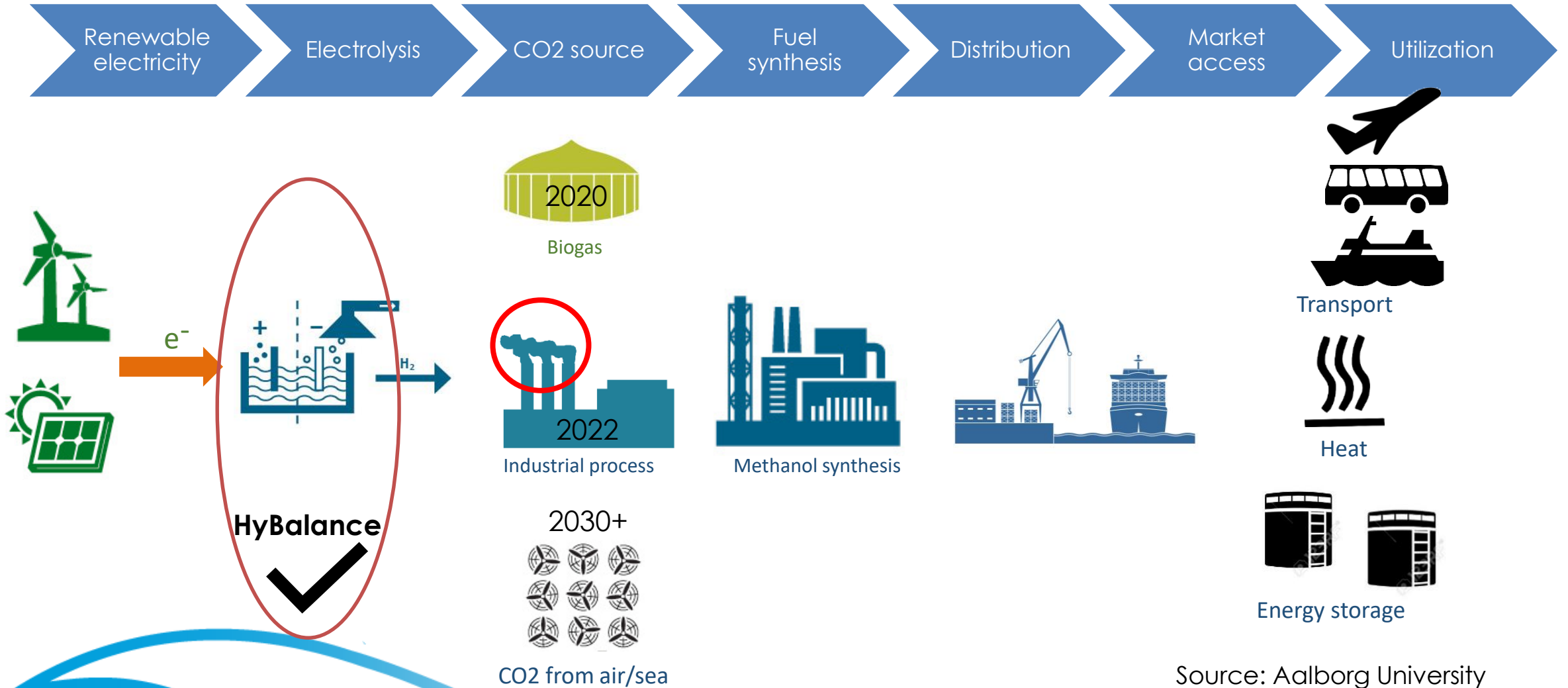
# The North Sea – a hub for renewable energy



\* Energinets Analyseforudsætninger 2017

Solution = Power-to-X

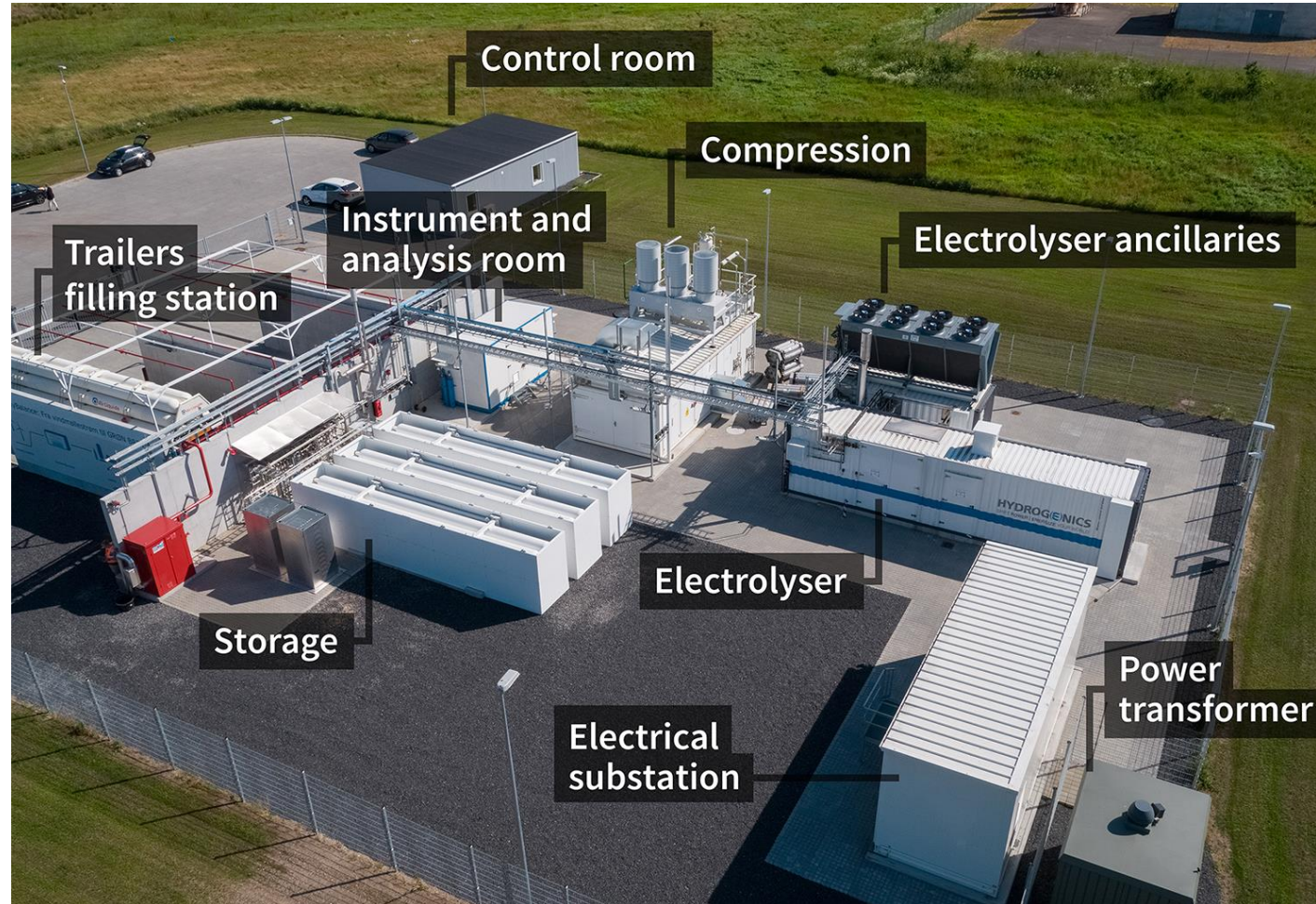
# The complete value chain



Source: Aalborg University

# HyBalance

# HyBalance overview



# The Next Steps

# Implementing phases - Hydrogen

- Hydrogen being launched in demonstrations across Europe
- Next step is large scale electrolysis and demonstration (+100 units)
- → price reduction of Hydrogen with a factor 3 towards 2030

## Alstom presents hydrogen train in six federal states in Germany

## Hype to roll out fleet of 600 hydrogen taxis in Paris

## Denmark receives EU funding for 200 new hydrogen buses

02 OCTOBER 2018 - CLEANTECH

Due to Denmark's strong position in the field of green energy and hydrogen technology, Denmark has been selected by the EU to receive EUR 40 million. The funding is expected to bring 200 hydrogen buses to Denmark.

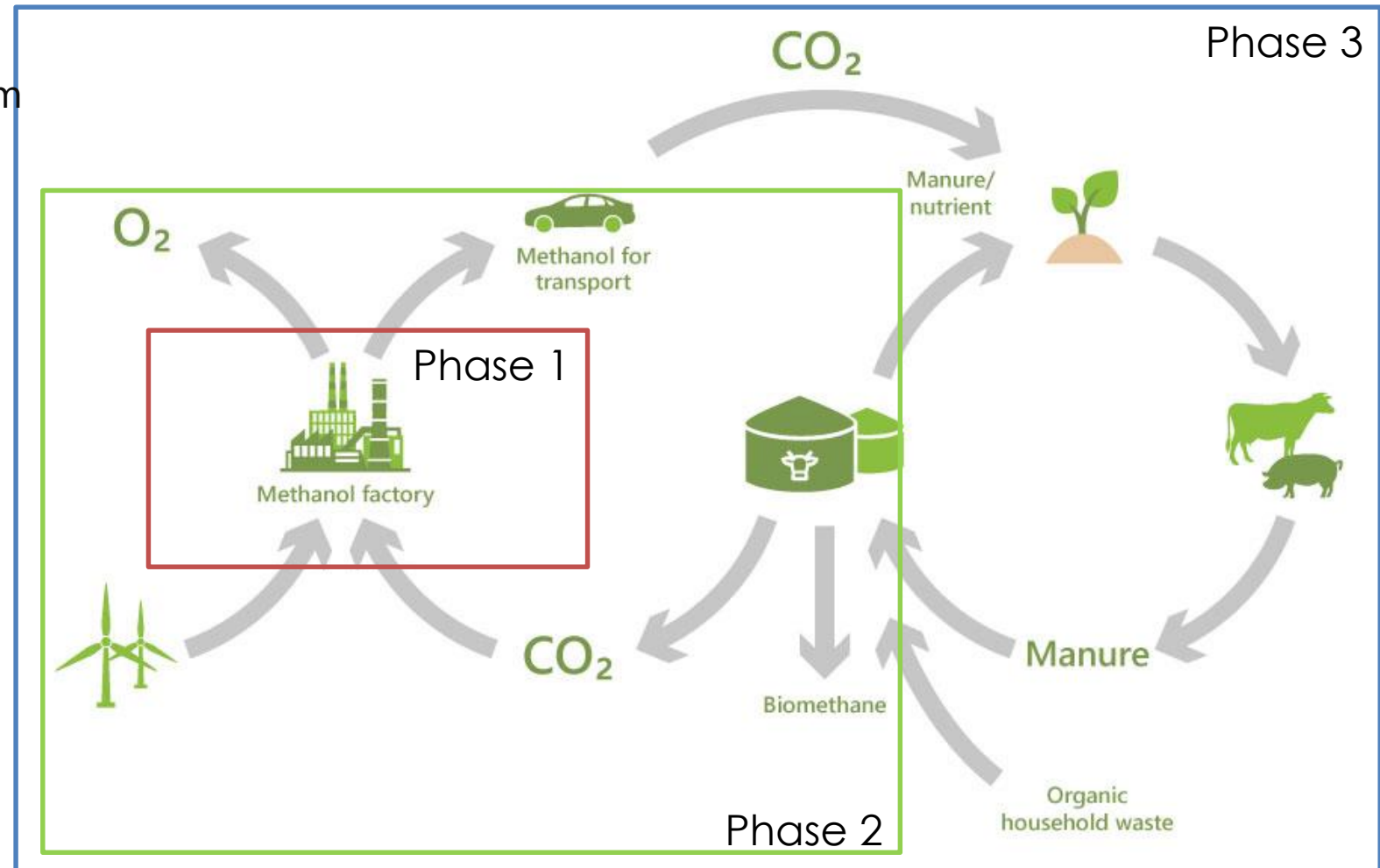


# Implementing phases - Methanol

Methanol Synthesis combines CO<sub>2</sub> from biogas with green hydrogen. This is a key enabler for the multi-output

Partners are biogas plant owners, industry and gas companies.

- Phase 1 – Pilot-demo at Aalborg University (STARTS March 1st 2019)
- Phase 2 – Full-scale test at biogas plant
- Phase 3 – Circular system involving all value streams



# Implementing phases - Ammonia

- Ammonia can be (and already is) produced in large scale.
- A Danish consortium plans to bring a large-scale green ammonia plant to market.
- This project meets future demand of CO2 neutral bunker fuels.

## MAN Energy Solution in World Trade



## MAN Energy Solutions to launch two-stroke ammonia fuelled engine

Wed 30 Jan 2019 by Gavin Lipsith

Following talks with windfarm developer Siemens Gamesa, MAN Energy Solutions plans to develop an ammonia-fuelled two-stroke engine for the marine market.

According to MAN promotion manager for dual-fuelled engines René Laursen, the engine designer will develop its existing ME-LGIP engine – **launched last year to burn LPG fuel** – to run on ammonia under a project expected to take around two and a half years. The talks with Siemens Gamesa were around ammonia supply and demand.

# Conclusion – Let's talk about heavy transportation

Electricity driven transport is important – but cannot solve all problems

1. Hydrogen can be used for heavy utility transport due to zero-emission profile, combined with fast charging (2-3 minutes)
2. Biomethanol can provide a low-emission alternative, and provide usage of the existing infrastructure
3. Ammonia can be easily implemented in e.g. ship engines

**All of the above requires Hydrogen**

## Scania-chefens hån mot Tesla: Duger till att transportera chips

TRANSPORT 07 dec 2017, kl 16:20



Foto: TT och Press

Alla är inte lika imponerade av Elon Musks nya lastbil.

# Get in touch



[www.hydrogenvalley.dk](http://www.hydrogenvalley.dk)



Hydrogen Valley



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