Osomo LBM Factory

from Concept to Operational Business

Introduction

- ✓ Founded 2009
- ✓ Since 2012 (Bio-)LNG/LBM
  - Liquefaction of (bio)methane 1st pilot plant in cooperation with Shell and Gasunie at Waste Water Treatment Plant in Apeldoorn
  - Stirling Cryocoolers in two Pilot installations
- ✓ Now
  - Patent granted for efficient (Bio-)gas-to-LNG process method
  - Patent pending for Cryogenic 3-phase-separator
  - 2014 upwards: 2nd Bio-LNG pilot plant to validate the patent and other research goals here at Acrres
  - Acquired rights of ZR-LNG technology from Gas Consult Ltd
  - Developed combined ZR-iLNG technology

Evolution LBM technology

NOW

5 ton/day Plant 2017
Econ feasible
Integrated and modulair system
4 million euros

Multiple Plants 5 ton/day
2017-2020
Supply chain of multiple sites

2nd Pilot Plant Jan 2015 – Dec 2015
Improved concept, Patent validation, Research

1st Pilot Plant Oct 2012- May 2013
Prove of concept

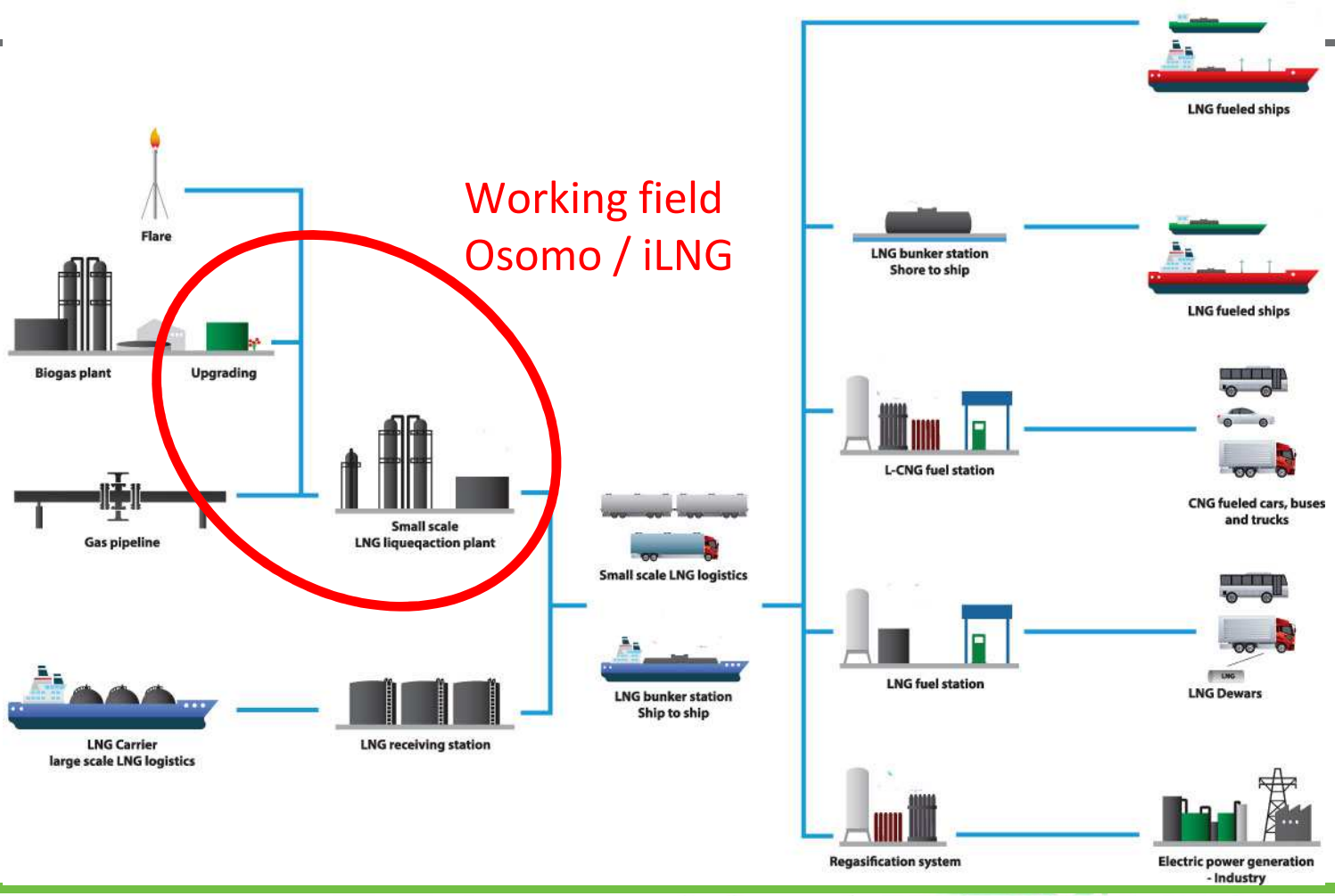
2nd Demo May 2012
1 day Fundraising demonstration

1st Demo 2011: Does it work?

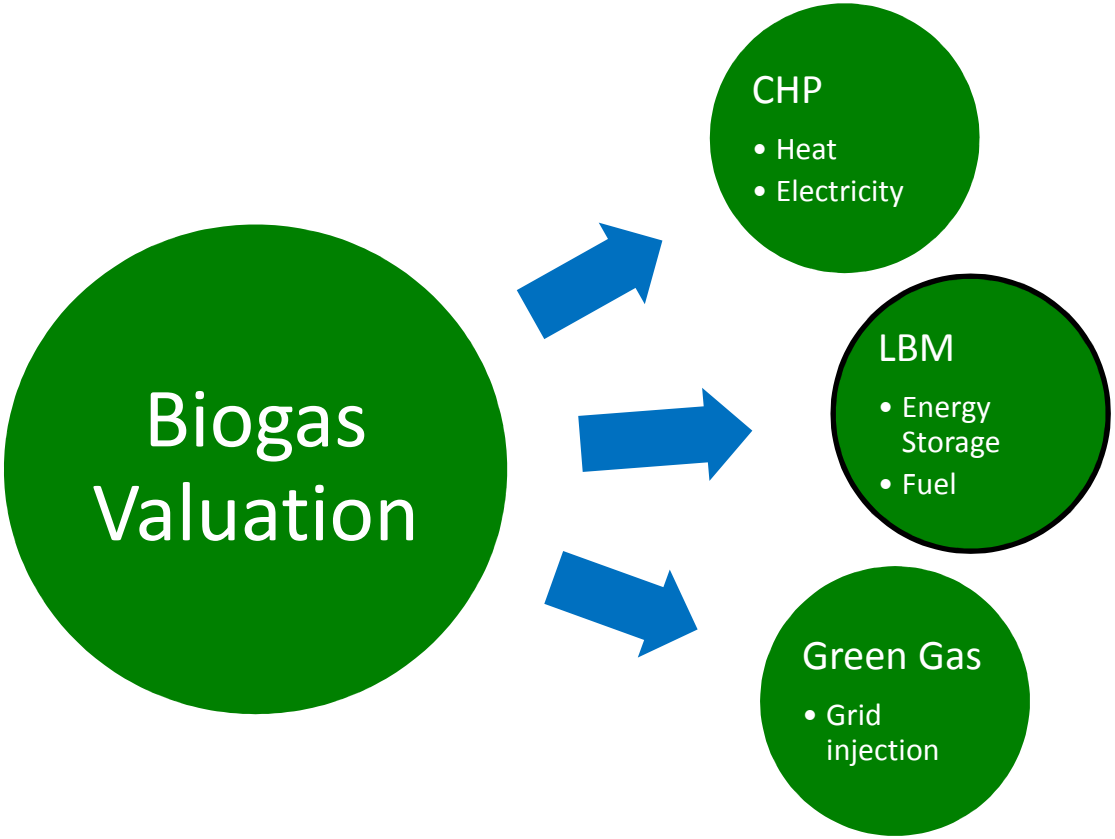



Pilot plant in Lelystad

Supply Chain LNG

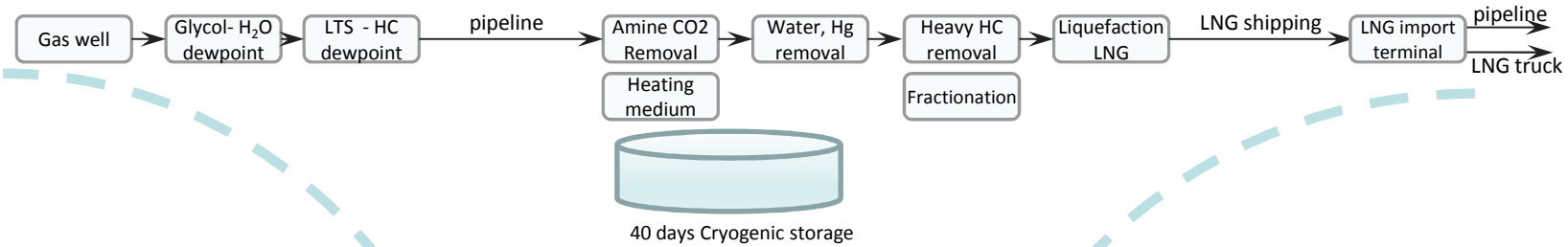


Valuation of biogas



How can small scale LBM compete with large-scale fossil LNG?

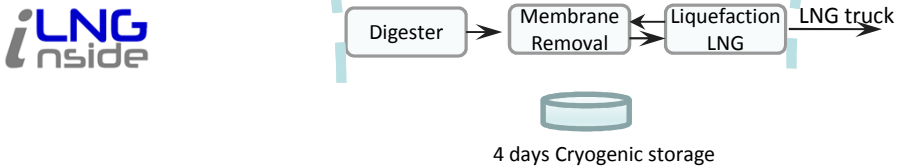
Conventional large scale fossil LNG



Simple, short, standard, supply chain

Competitive specific capex

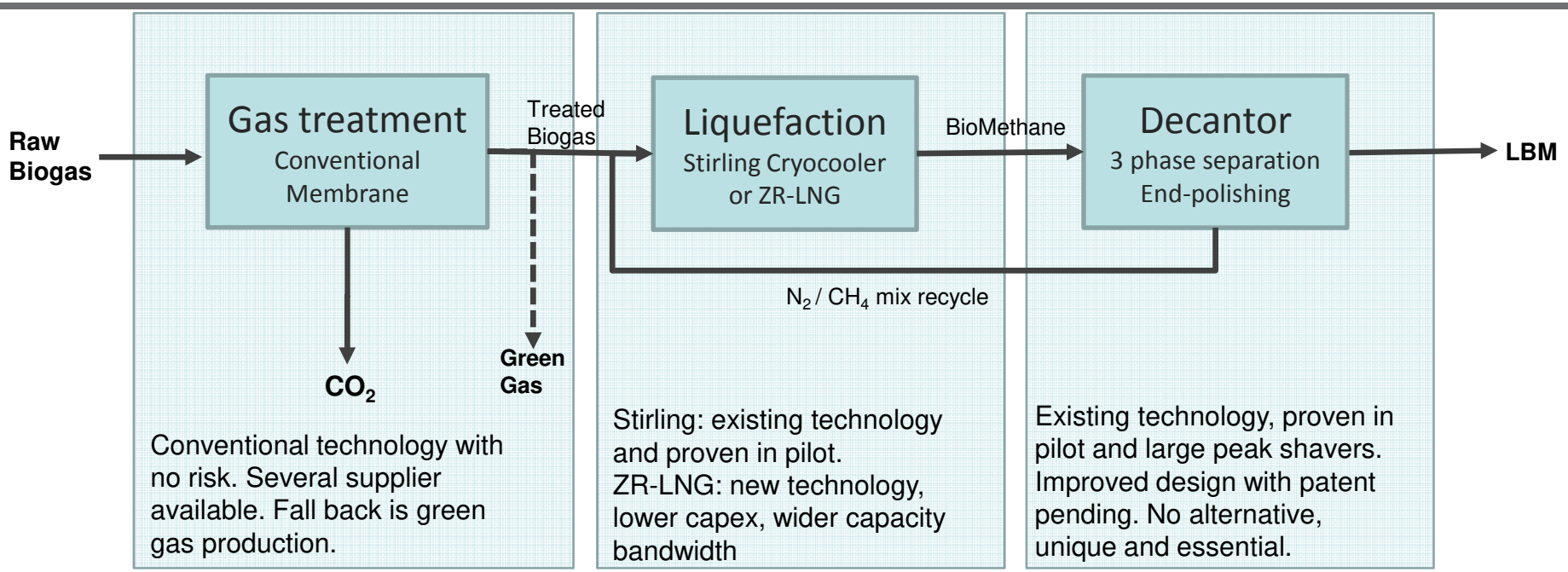
Biogas to LBM; iLNG technology



Possible by;
- CO2 tolerant liquefaction
- Integrated with membrane gas treating

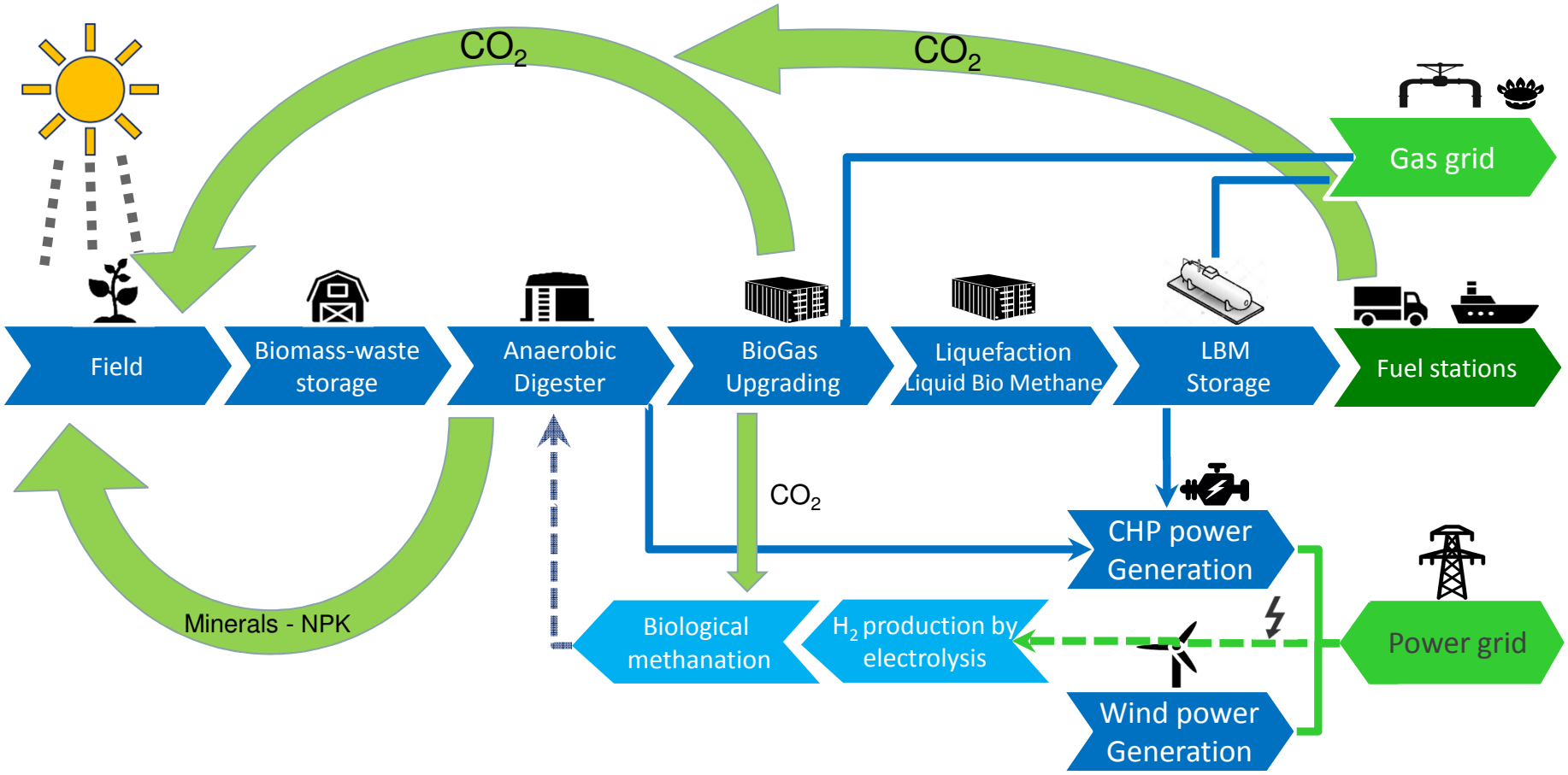
Simplified Process scheme

iLNG technology



Unique simplified integrated proces method, non-obvious combination of proven existing techniques.

Valuation model of LBM



Purpose local LBM/LNG

- ✓ Reduce installed base of centralized capacity of conventional power plants
- ✓ Decentralized storage connected to three grids: grid balancing between supply and demand on daily bases in every and between the three networks at local basis
- ✓ Strategic energy storage: one LNG fuel station storage tank of 60 m3 has the same energy storage as the batteries of 2200 Teslas

Market Perspective

- ✓ New Renewable Energy Directive (2020 upwards) has an progressive increasing greening policy. This has a major impact on fuel blending rates.
- ✓ LNG is a growing market as substitute for conventional fossil fuels especially for heavy road transport and inland and short sea shipping. There is no short term alternative available to reduce emission then LNG.
- ✓ LBM is the green counterpart for LNG, and is necessary for further growth of the LNG market

Summary

- ✓ Smart integration is the key-word
- ✓ Energy transition is no revolution, but evulotion
- ✓ LBM is a local produced subsitute for three kinds of energy demands
- ✓ LBM can take a central role in this process and make it happen with the optimal use of existing infrastructure
- ✓ More research need to be done on convertion efficiencies and system interactions
- ✓ It can be done now, not a promise like H2

Questions or remarks?

More info on our website and youtube channel

[Osomo Projects BV Deel 1]

[Osomo Projects BV Deel 2]

[Osomo Projects BV Deel 3]

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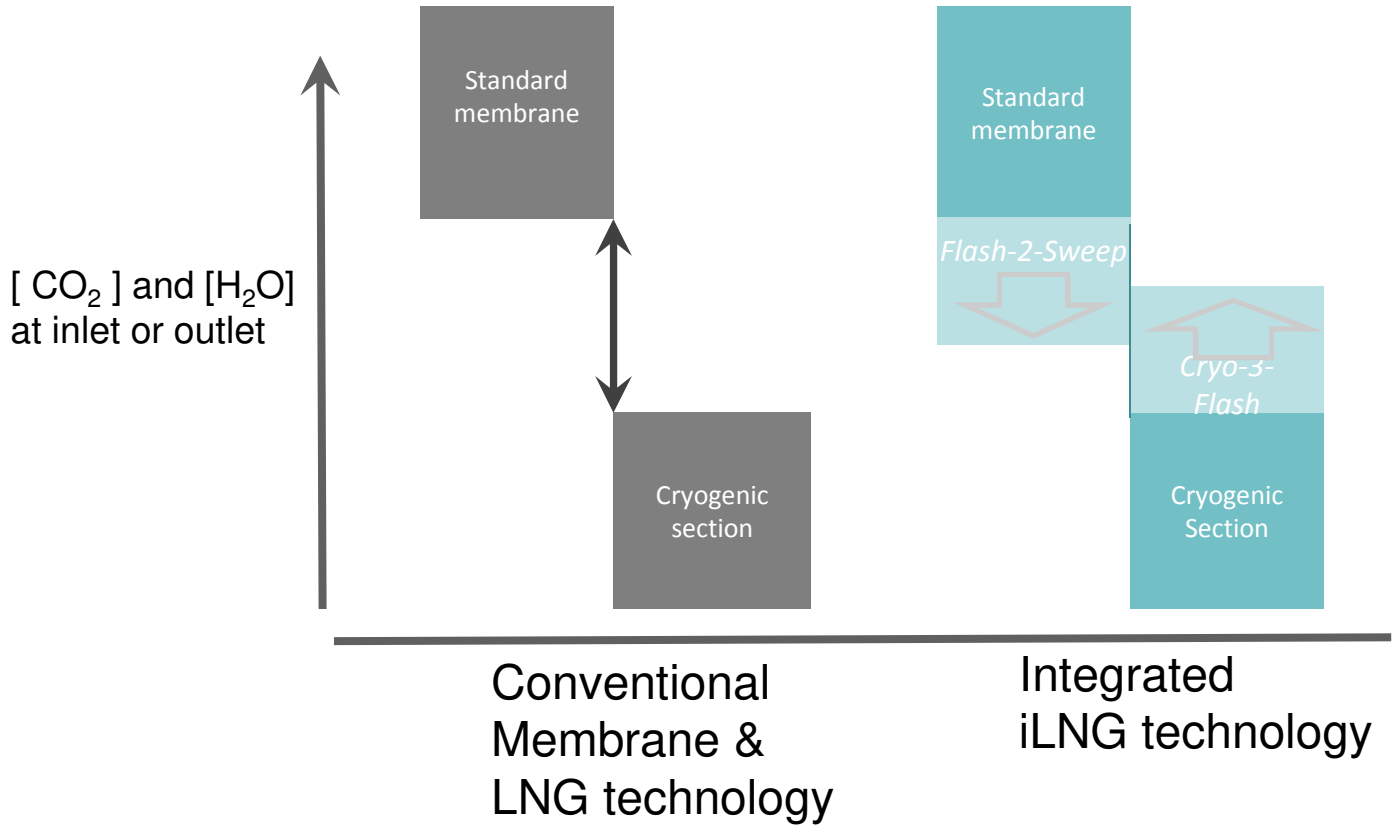
Extending the design envelope of standard equipment
Closing the gap and making the link



iLNG USP's

- Low risk, low equipment count, robust, simple, reliable, simple, N2 tolerant
- Validated process line-up with actual field data that works on very small scale (< 10 ton/dy)
- Patented process method
- Build up with conventional proven components
- No issues with freeze-out, because of end-flash in three phase separator => patented component design. Holy Grail also for competitive liquefaction technologies
- Till now the only problem-free small scale LBM factory. We know how to make LBM successfully and we know the pitfalls.