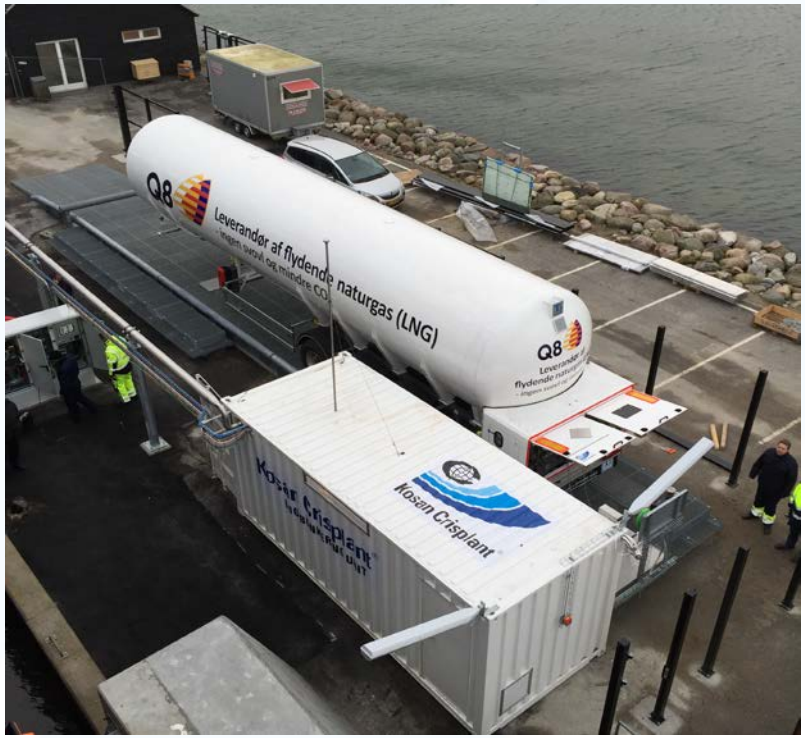
Kosan Crisplant®

March 2015

KC LNG solutions

64 years in the Gas business



We are ”GAS PEOPLE”
LPG, LNG, Industrial Gas

Worldwide references

- More than 2,500 plants/ larger installations supplied since 1951
- Clients in more than 130 countries around the world, covering large international corporations, state-owned enterprises, national oil and gas companies and small

The founder of Crisplant

The founder of the company, Svend Christensen, was born in 1920 and died in the autumn of 1987. The company's name, "Crisplant", was derived from his surname.

CRISPLANT A/S

Contact to the gas trade

For a while we shared the premises with Kosan Gas. It was here that we first established concact with the gas trade. We realized the great potential of the chain conveyor for transport of gas cylinders.

CRISPLANT A/S

Shipment

On 1st November 1945 we moved to Åboulevarden – and entered a contract with DFDS. Large quantities were shipped. Loading and pilotage were difficult procedures until the company made the job easier by means of pallets and fork-lift trucks.

CRISPLANT A/S

Large increase in orders

We found ourselves with a large increase in orders and the workshop on Brendstrupvej was too small, so we had to expand it that cost money. At this point both Kosan Gas and Calor Gas in England were interested in buying into the company. And as we know, Kosan Gas became the shareholders.

crisplant a/s

Rock-solid product areas

Core business

The Kosan Crisplant Group is a project-oriented corporation that makes business within the LPG and
LNG/CNG industry. We supplies systems and turnkey plants for filling and maintenance of LPG cylinders. We supply process technology, equipment and turnkey plants for LNG applications.

For both business areas, we offers after-sales and engineering services, facility management and supply of components.

Kosan Crisplant®

KC Engineering™

- Project management
- Site management
- Electrical engineering
- Pipe engineering
- Civil engineering
- Risk management
- Survey and analyses
- International norms and standards

Filling Plant - KUWAIT

145 M€ / 30 M€

LARGE

Kosan Crisplant

KOTC in Kuwait
The plant of the century

KOTC (Kuwait Oil Tanker Company) in Kuwait is building the world's most modern, fully automatic filling plant in the middle of the desert, at Umm Al Aish, north of Kuwait City. The opening is planned for 1 March 2013.

It all began in 2007, when KOTC decided to build 'The Plant of the Future', to relieve the pressure on the facility at Mina Abdullah. KOTC's requirement was simply that the future LPG facility should be the world's most advanced.

Mouchel, the international consultant engineers were responsible for developing the tender material and they left the design of the gas filling facility to a French company which was to prepare the technical specifications for a classical facility. However, they ran into space and logistics problems,

because the requirements for the site demanded many different facilities such as administration buildings, social buildings, a covered parking area, tank storage, workshops and two filling halls with constant gas deliveries by road tanker from the refinery.

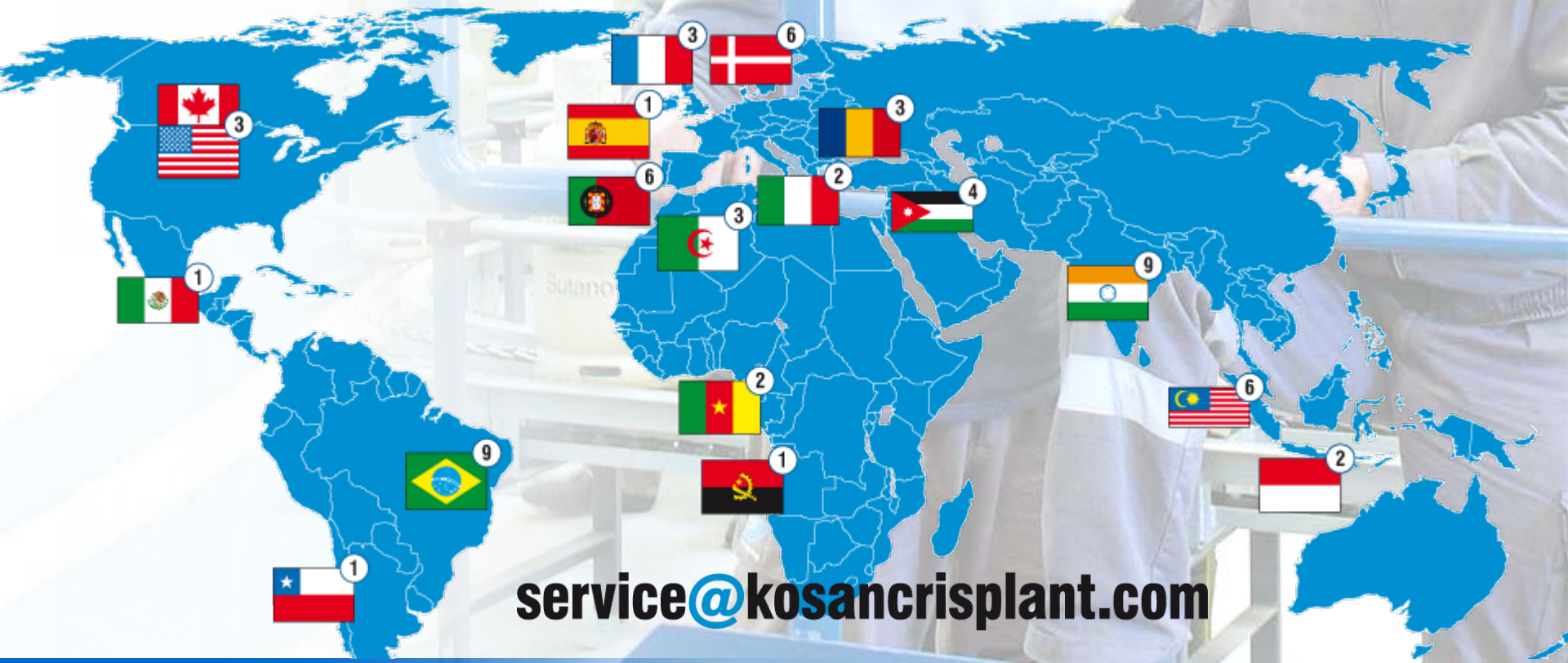
***FLEXSPEED* solves space and logistics challenges**

This was in 2008, and KC's *FLEXSPEED*, the world's most advanced high capacity filling system had just been introduced onto the market. KC France was invited to come and inspect the new product. Using a *FLEXSPEED* solution, they designed a facility with greater capacity on a smaller site than would have been possible with a traditional solution.

Kosan Crisplant®

KC Service™

- Worldwide service network
- Tailor-made service levels
- All from spare parts to full Facility Service

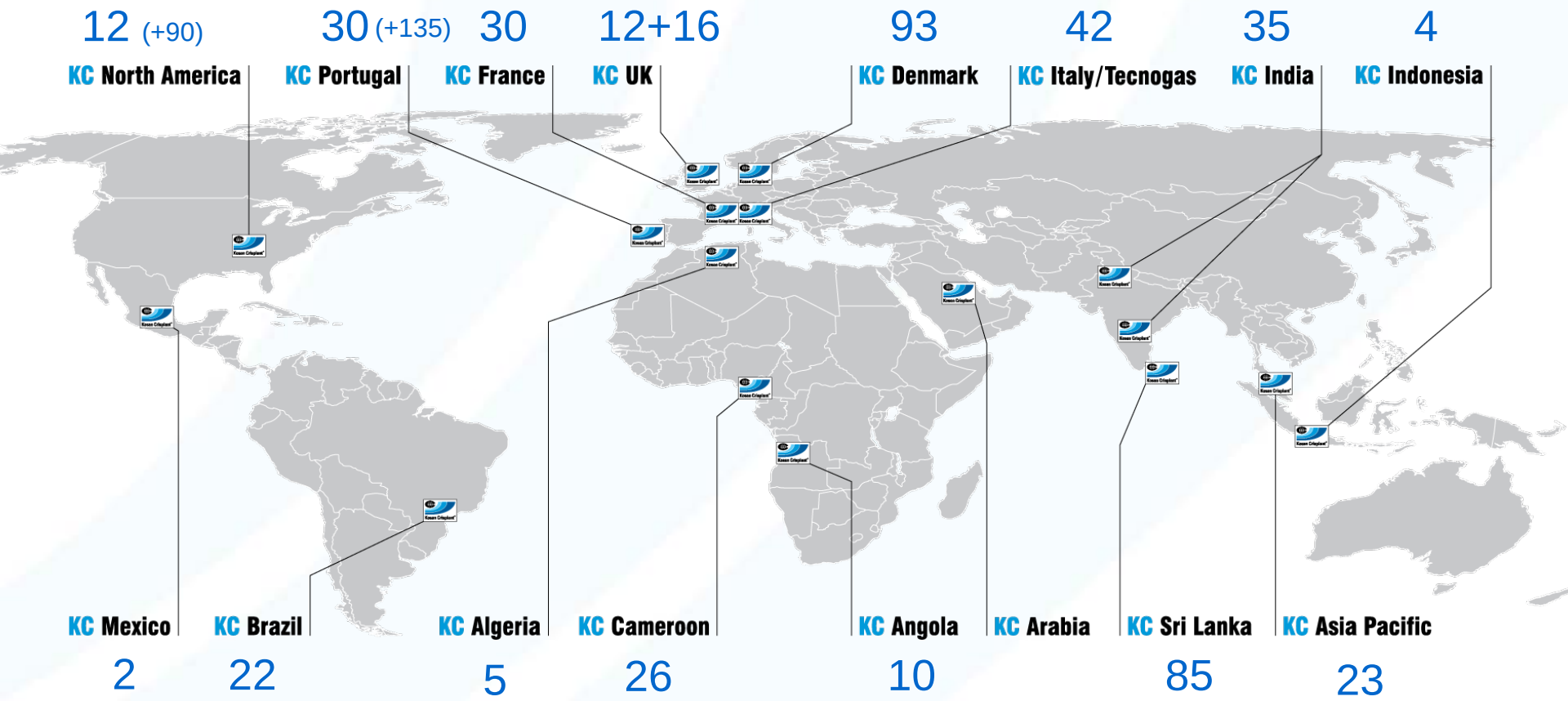


service@kosancrisplant.com

KC - facts #

The Kosan Crisplant Group

Around 500 employees plus freelancers/partners worldwide



Project portfolio / Facts & figures

- Projects active 13/14: 201
- Total value: DKK 507 mill
- Deviation Y.E: DKK 7,4 mill positive
- Deviation in %: ~ 1,45

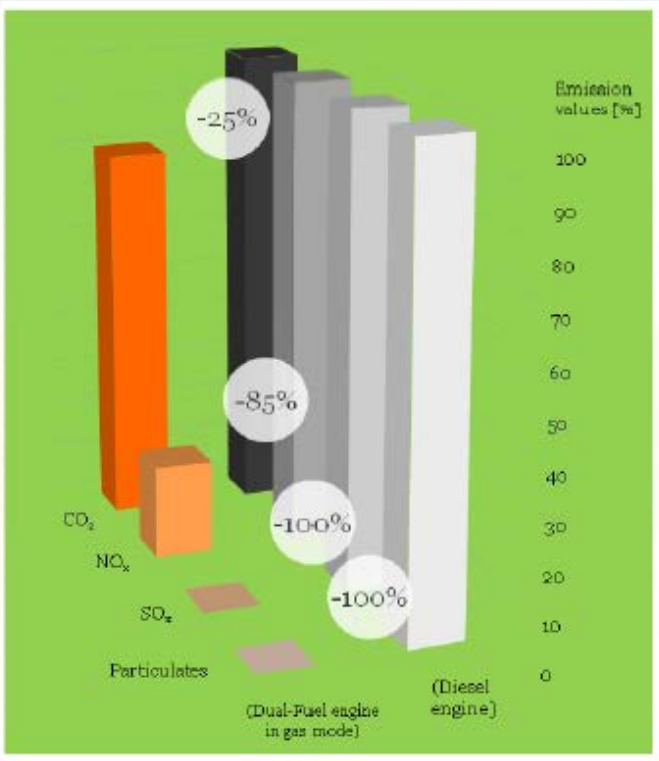
<u>account year 13/14</u>

TURNOVER	**: 565 MDKK - M$ 105 - M€ 76**
EBITDA	**: 57 MDKK - M$ 10.6 - M€ 7.7**
ORDER INTAKE	**: 535 MDKK - M$ 99 - M€ 72 (+20 M€ from 'services')**

Greener

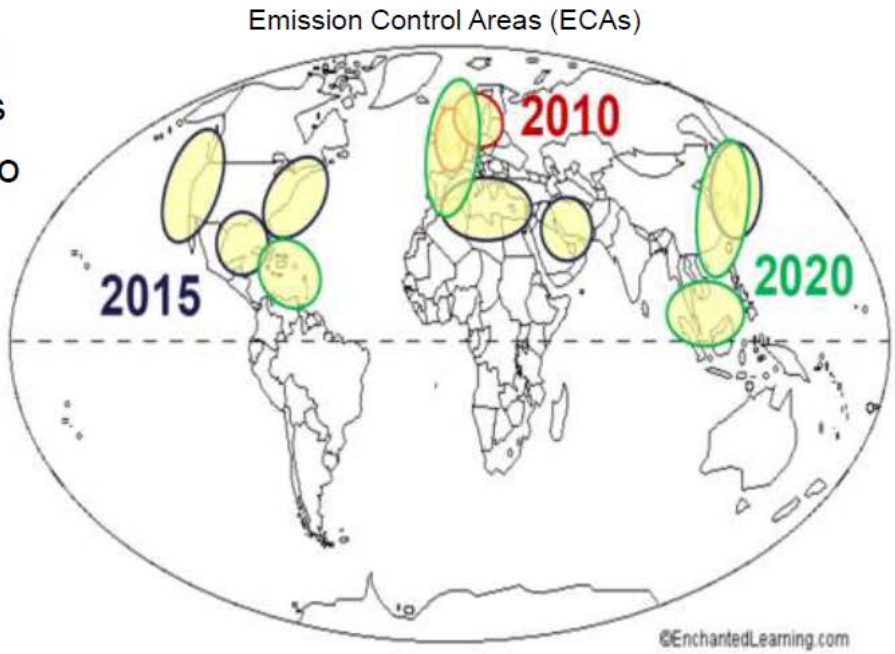
LNG as marine fuel

- To comply with current and future emission regulations
- Clean operation of engines
- Fuel cost savings
- Low noise operation
- Eliminates risk of oil spills



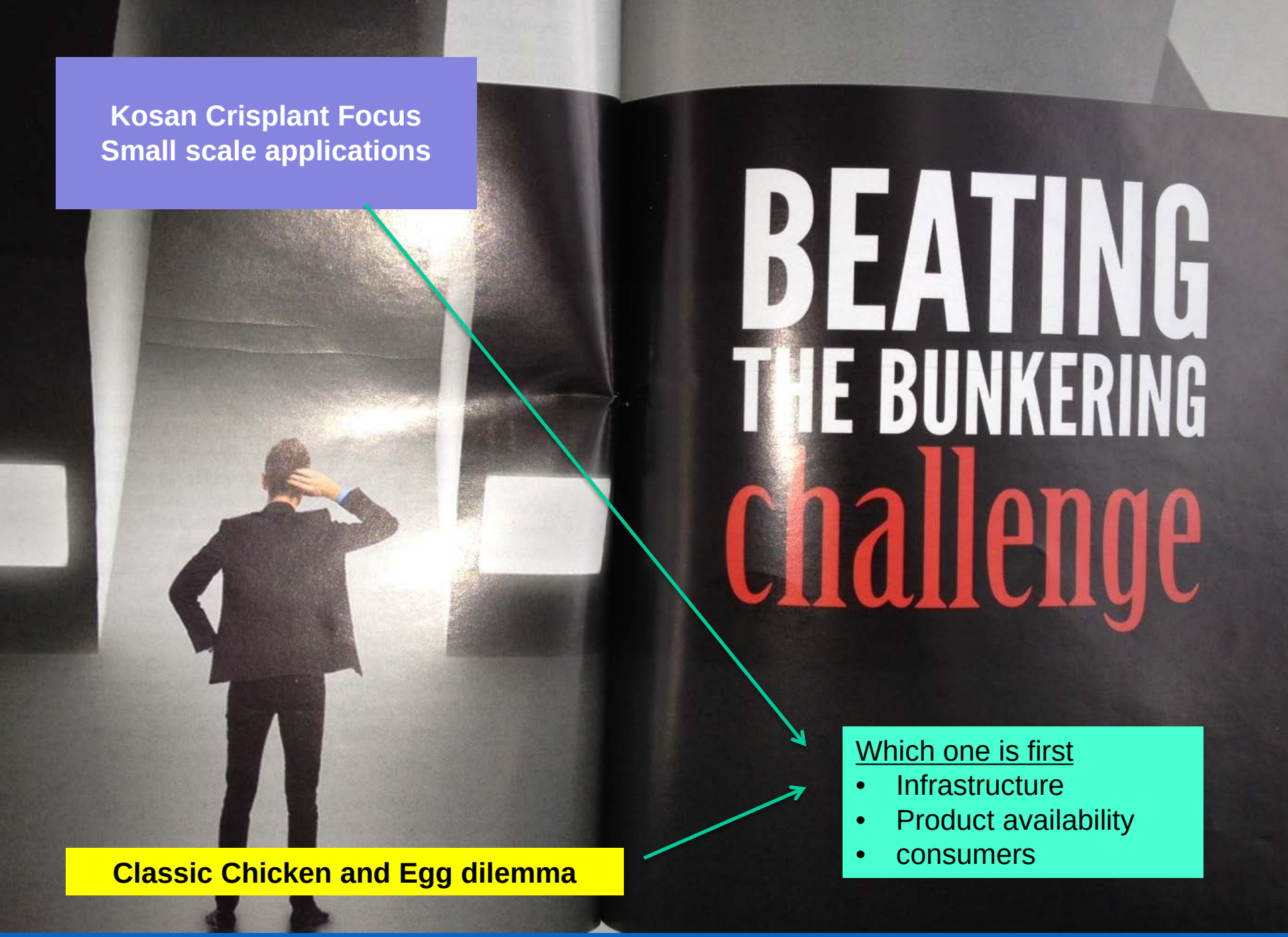
Decisions to be taken in near future

- 15 biggest ships produce more emissions than 760 million cars
- Emission Control Regulations to take effect over next 10 years



- Other advantages to switch:
  - High efficiency
  - Combustion friendly
  - Good engine technology
  - Fuel cost (short payback)

Bunkering system, Samsø Denmark



Kosan Crisplant Focus
Small scale applications

Classic Chicken and Egg dilemma

<u>Which one is first</u>

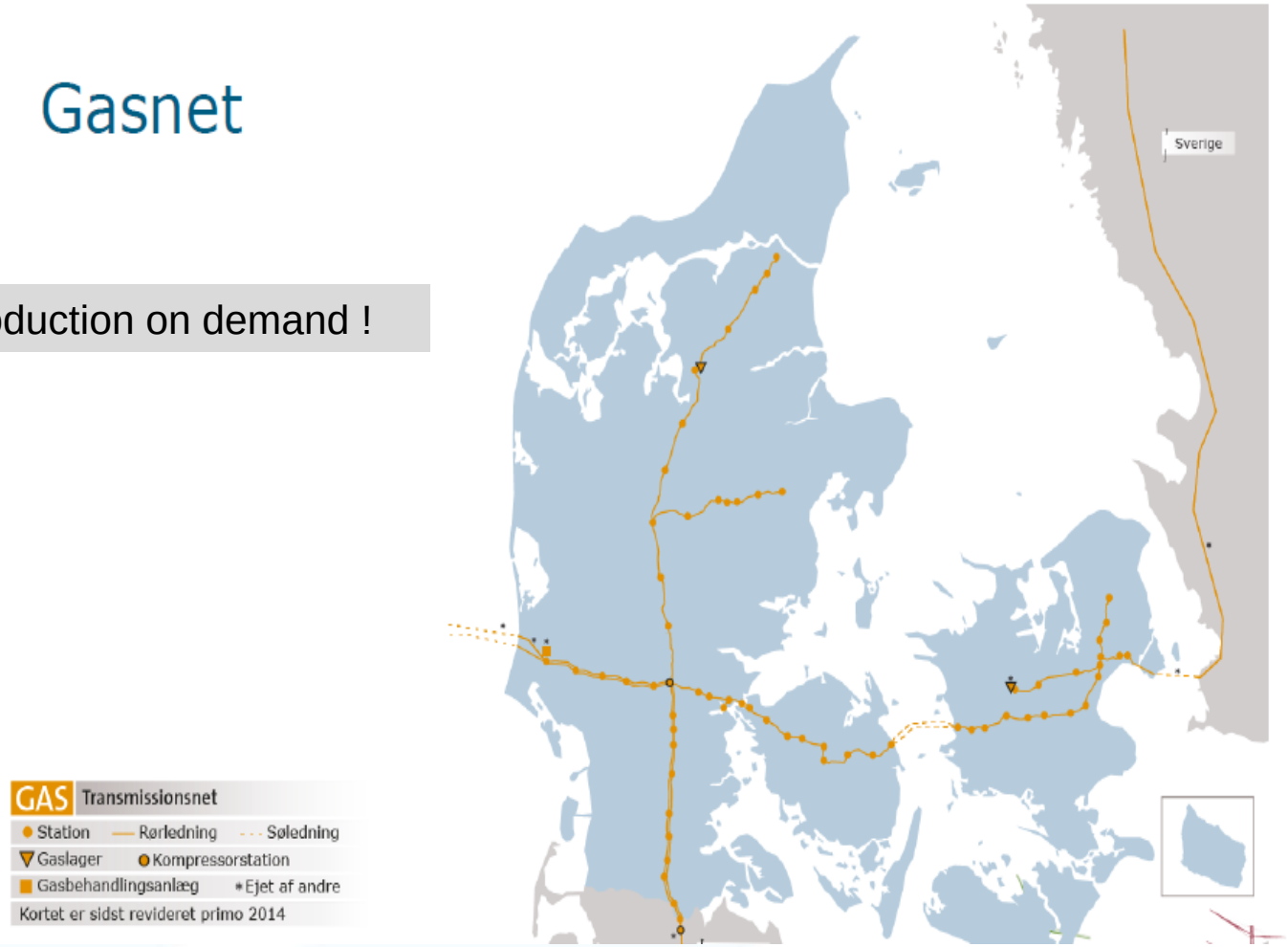
- Infrastructure
- Product availability
- consumers

Where does the product (LNG) come from ?

ENERGINET DK

Gasnet

Production on demand !



Blaa Inno+ project

Development of an efficient small scale liquefaction unit that locally will be able to liquefy natural gas as well as bio gas

Partners:

DTU

MOVINGENERGY

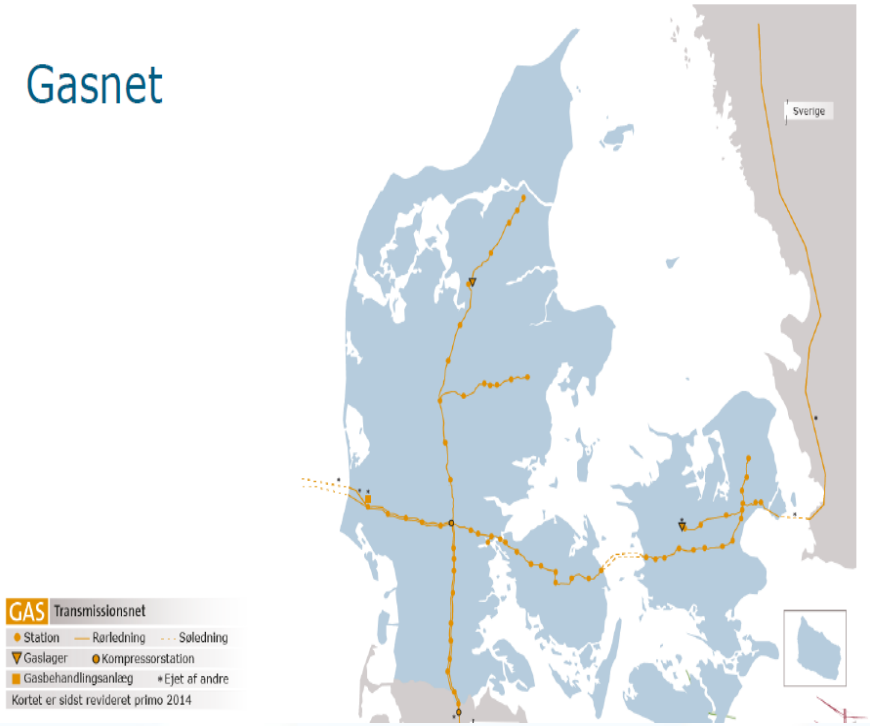
Time schedule:

- Spring 2015 – Technical calculations ready and OPEX determined
- Second half 2015 – Laboratorie test of major components and development of refrigerants
- Spring 2016 – Detailed design of complete plant
- Second half 2016 – Construction of test plant or full scale plant.
- Spring 2017 supply of LNG to the local marked

The Danish Maritime Fund

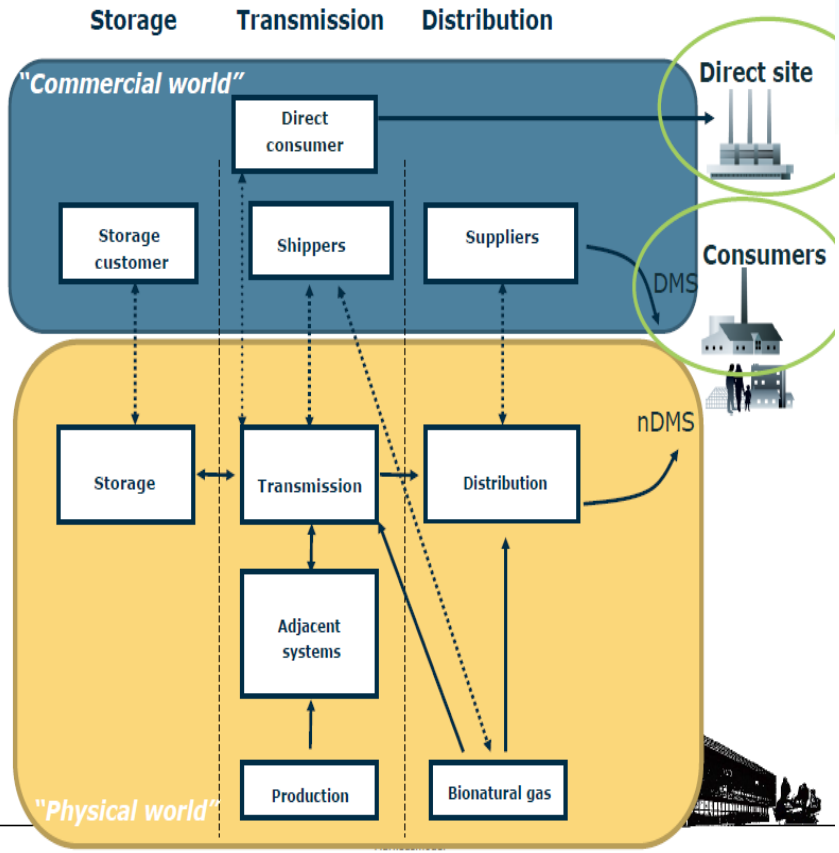
Where to place it

Gasnet



ENERGINET/DK

Roles on the Danish gas market

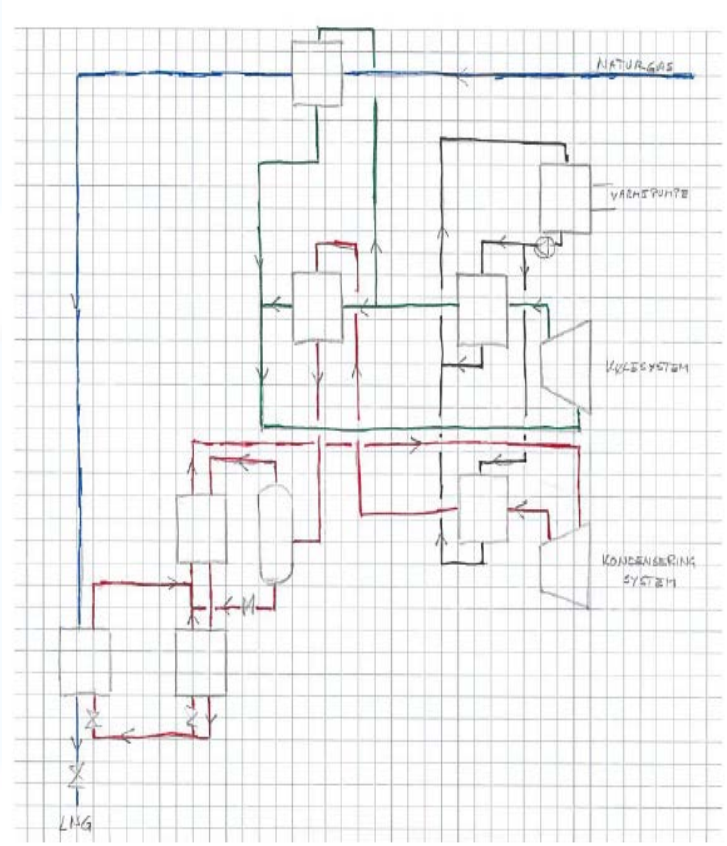


Liquifaction unit

The technology used is the MCR (Multi Component Refrigerant) and consist of 4 different circuits

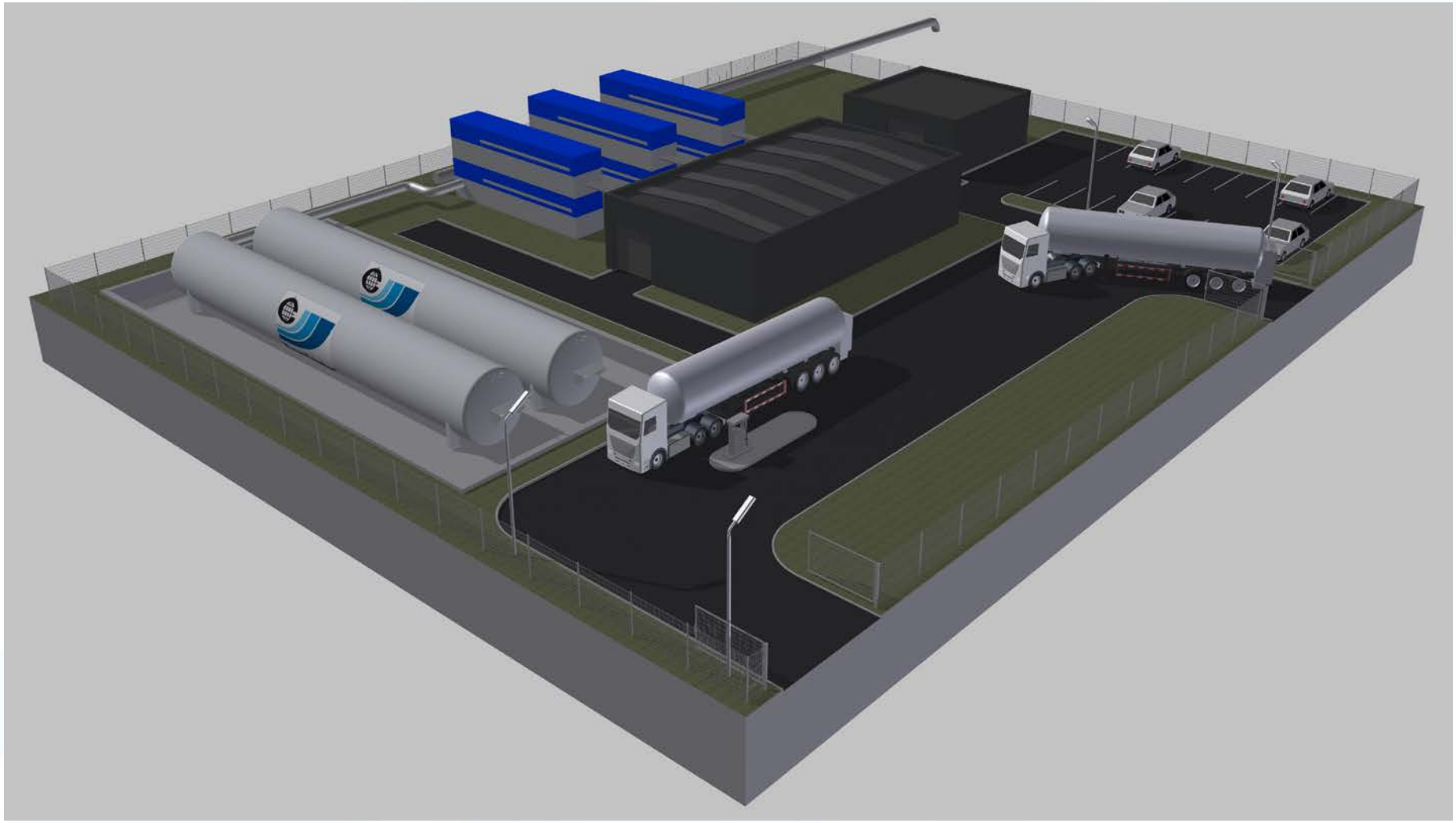
Facts:

1. Connected to 40/80 bar NG grid.
2. Removal of THT
3. Separation of CO^2
2. Normal conventional cooling system
3. The condensation plant where a cooling system with multicomponent refrigerants where the natural is cooled down to the last point for liquefaction.
4. Stored in semi pressured tanks
5. Distributed by tank-trucks to consumers



Figur 1: Det samlede anlæg i forenklet form

General layout of a small-scale LNG liquifaction plant



Production figures

	LNG			Natural gas comsumption
	Qty	Vol	Energy	Nm^3
	Ton	m^3	Mwh/year	
Year production max	15.300	35.581	185.725	21.348.837
Year production min	5.100	11.860	61.908	7.116.279

17-51 Ton/day

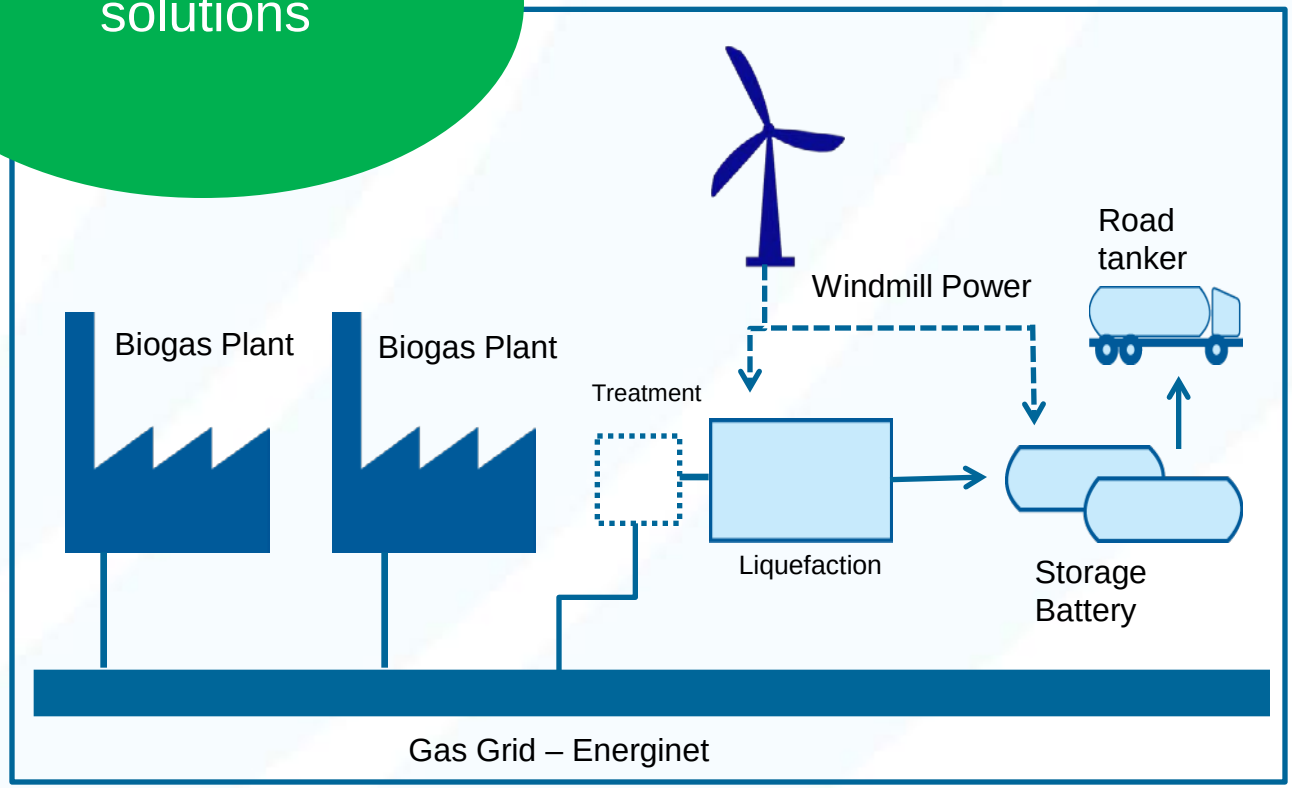
OPEX figures
0,0056 €/kWh / 5,56 €/MWh

Add:
TTF Day Ahead + suppliers add.
Distributionstarif til Energinet.dk
Energisparebidrag
Nødforsyningstarif til Energinet.dk
Offentlig forpligtigelse biogas

Liquefaction of ”Green LNG”

Buffer system already in place

Green energy solutions



Wherever you are, we are

Foundation for culture = values

Be passionately involved
Share your knowledge, make others good
Understand and help ”your customers”
We’re not leaving anybody behind
Put the ”fish on the table”