



Cold energy utilization

VALCON

Potential cold energy users

By where energy is going to be used



Concentrated users

Cold energy and LNG is used in the same place. Natural gas is transported by local gas network.



Distributed users

Cold energy demand is not the same place. Natural gas is transported by public gas network.

Potential cold energy users



Refrigeration

Technologically simple. Usually demand for cold energy and LNG is distributed.



Brayton cycle efficiency

Chillers for gas turbines. Is not technologically complex. LNG and cold demand is in the same place



Cryogenic utilization

Not efficient and technologically complex. LNG and cold energy demand is usually distributed

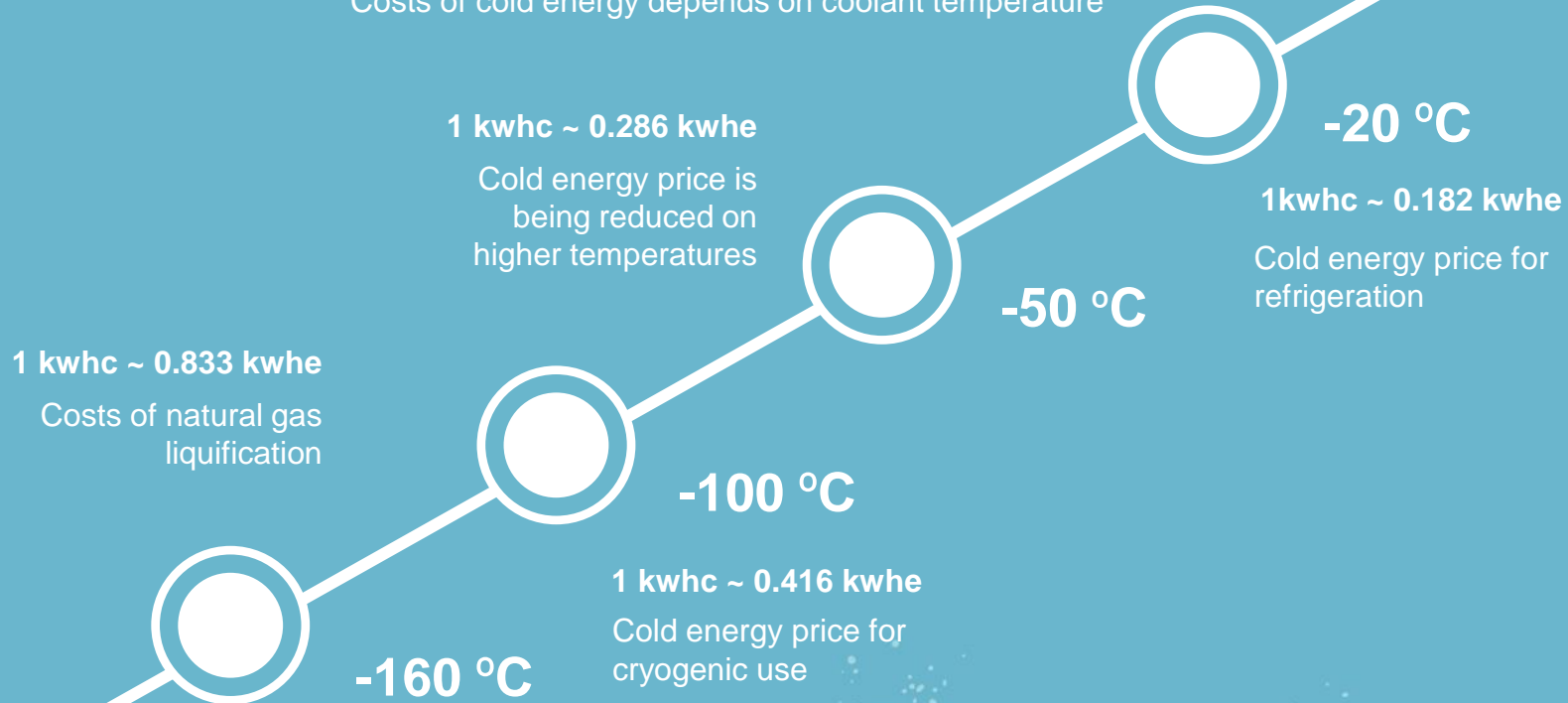


Combined

All or some of above combined. Not easy to consolidate gas and cold demands. High efficiency

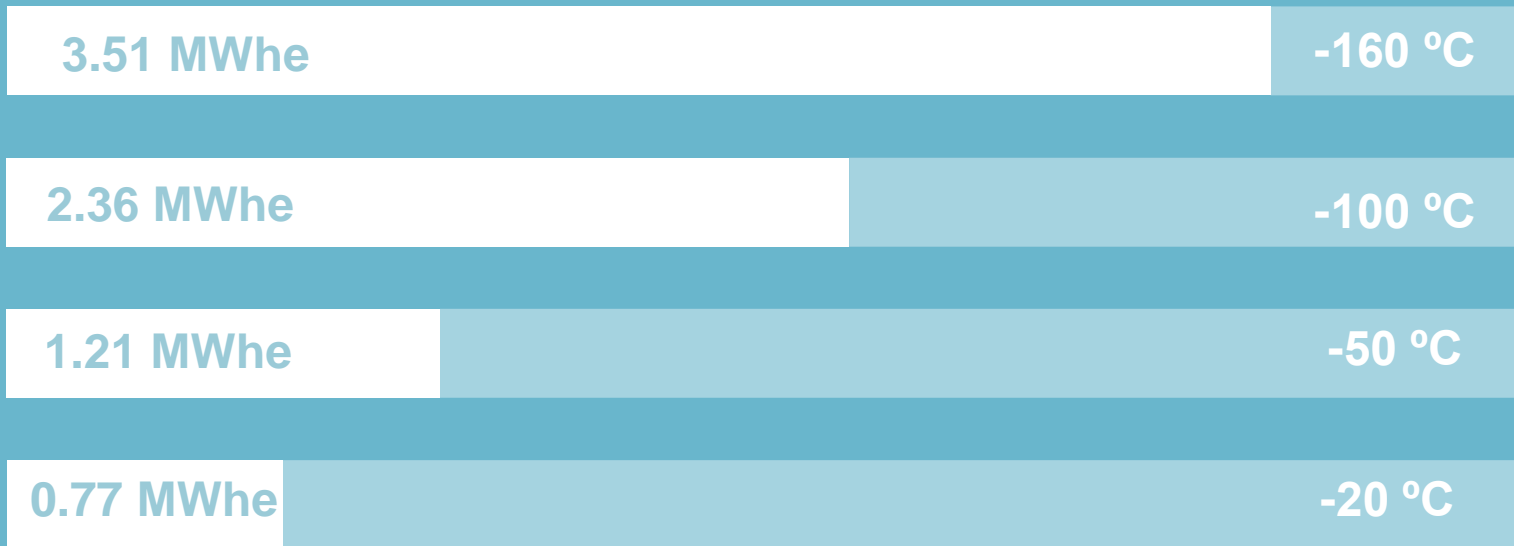
Costs of cold energy

Costs of cold energy depends on coolant temperature



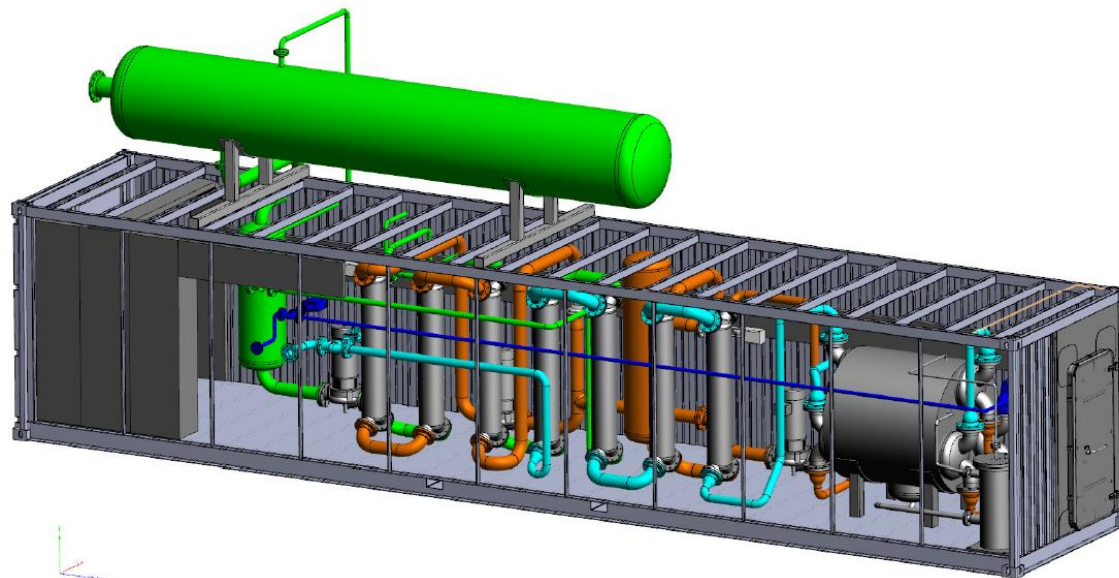
Amount of cold energy wasted

On one LNG truck



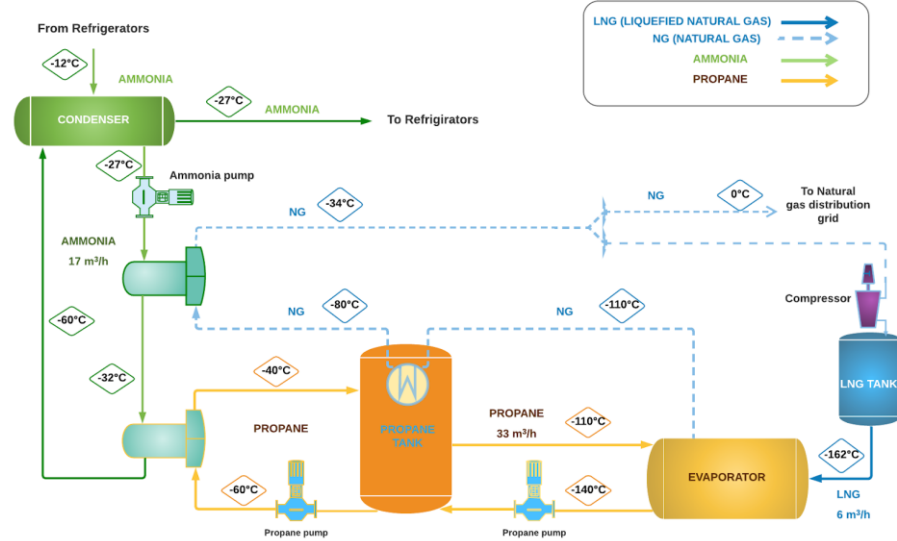
Exergetic Cold Energy Recovery System

Mobile cold energy recovery system, which transfers cold energy from very low temperature LNG to higher temperature coolant or fluid.



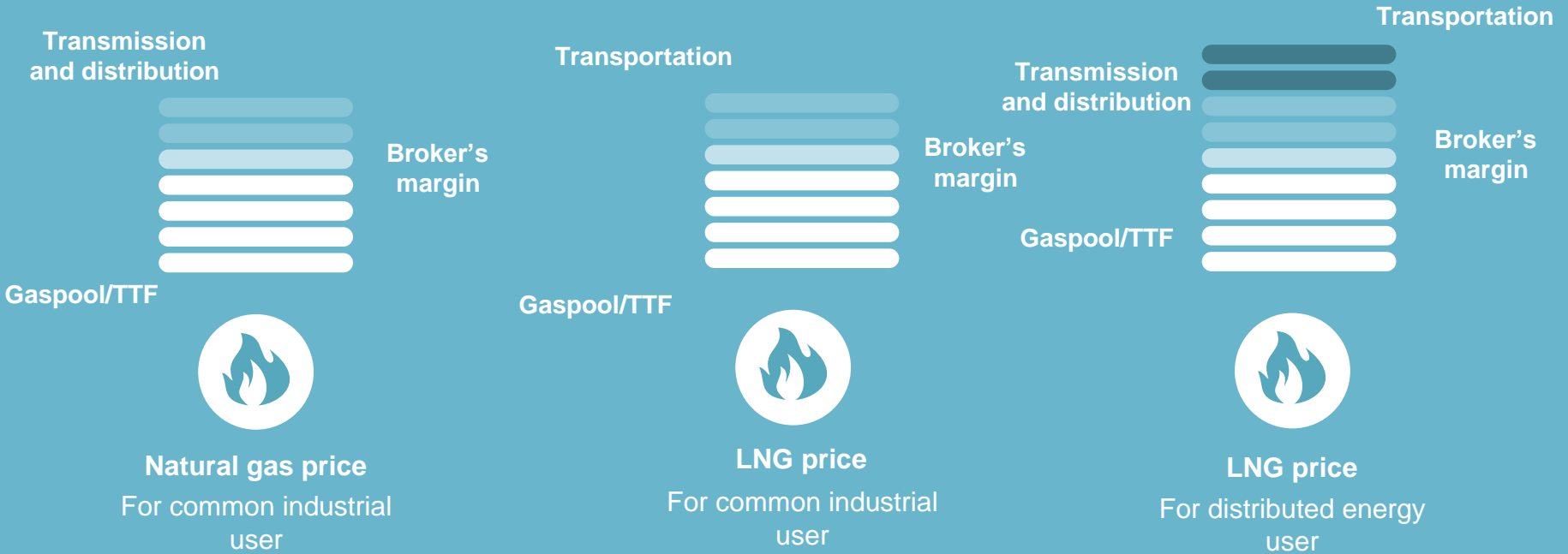
- Flexible;
- Mobile;
- Scalable;
- Low power consumption;
- Eco-friendly;
- Cascaded energy gathering.

EXERGETIC COLD LNG ENERGY RECOVERY SYSTEM



Distributed energy consumer

Cold energy and natural gas demand is not in the same place



Distributed cold energy user

Cold energy and natural gas demand is not in the same place



LNG transportation

>



Cold energy recovery

0.77 – 3.51 MWh

Consolidated cold energy user



Demands should coincide

Not only by place, but also by time



Full picture

Projects must be evaluated as a whole: LNG implementation + cold energy recovery



Technology

Simple and low maintenance

Further development

- Focusing on early stage project planning involving cold energy utilization in line with LNG use.
- Installation size needs to match equipment cost.
- Ports with refrigerator warehouses and LNG infrastructure can benefit.



Thank you