dunkerque LNG
fluxys

78th TSG Meeting
WG related to CO2 emissions

OCTOBER 2025

Status

Decisions from last TSG meeting in London:

- With support of TSG chairman, Mr. Planteline will issue a template for deploying a Case Study Presentation. Mr. Planteline will collect, through this template, the few initiatives that were reported into the questionnaire.
- An overview report could be envisaged in a second step if the number of case study is significant enough

Pending:

- TotalEnergies will give a presentation at next TSG meeting on their closed flare system.

Case Study Presentation

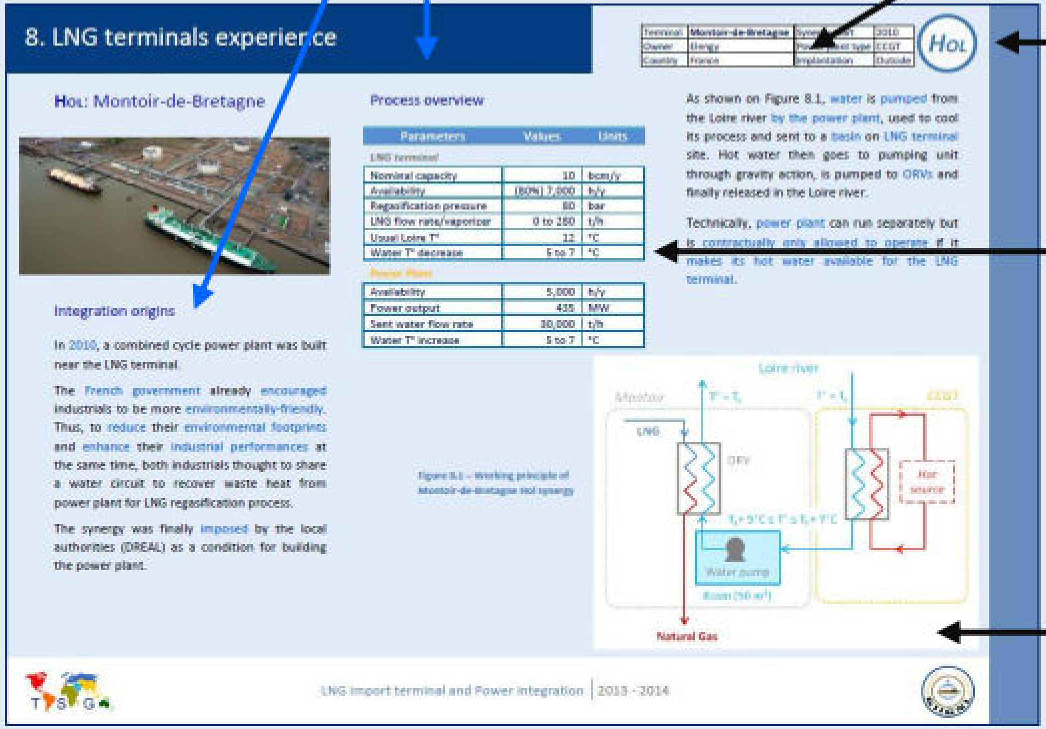
When information was obtained, integration origins, process overview, some elements of costs, generated benefits and return of experience are provided.

Recap table: LNG terminal & synergy

Logotype of the synergy
Same as in 6th part

Operating parameters: LNG terminal & synergy

Scheme of working principle: for both LNG terminal and power plant, only necessary to understand the synergy principle units are represented.



8. LNG terminals experience

Terminal	Montoir-de-Bretagne	Synergy start	2010
Owner	Elengy	Power plant type	CCGT
Country	France	Implantation	Outside

HoL: Montoir-de-Bretagne

Integration origins

In 2010, a combined cycle power plant was built near the LNG terminal.

The French government already encouraged industrials to be more environmentally-friendly. Thus, to reduce their environmental footprints and enhance their industrial performances at the same time, both industrials thought to share a water circuit to recover waste heat from power plant for LNG regasification process.

The synergy was finally imposed by the local authorities (DREAL) as a condition for building the power plant.

Process overview

Parameters	Values	Units
LNG terminal		
Nominal capacity	10	bcm/y
Availability	(80%) 7,000	h/y
Regasification pressure	80	bar
LNG flow rate/vaporizer	0 to 280	t/h
Usual Loire T°	12	°C
Water T° decrease	5 to 7	°C
Power Plant		
Availability	5,000	h/y
Power output	435	MW
Sent water flow rate	30,000	t/h
Water T° increase	5 to 7	°C

As shown on Figure 8.1, water is pumped from the Loire river by the power plant, used to cool its process and sent to a basin on LNG terminal site. Hot water then goes to pumping unit through gravity action, is pumped to ORVs and finally released in the Loire river.

Technically, power plant can run separately but is contractually only allowed to operate if it makes its hot water available for the LNG terminal.

Figure 8.1 – Working principle of Montoir-de-Bretagne HoI synergy

Use Case n°X : TITLE

Terminal		Year of implementation	
Operator		Scope concerned	
Country		Reduction achieved (tCO_2/yr)	

Technical description:
Present and explain briefly the solution developed, its key principles and parameters, where it applies on the terminal (equipment concerned).

Context and origins:
Present and explain briefly the drivers and the context leading to the implementation of the solution (self initiative, local law, shareholder requirement, economic incentive…, ESG aligment)

CO_2 reduction objectives :
Scope concerned (1/2)
Reduction target : Absolute (tCO_2/yr) and/or relative (% reduction vs baseline)
Reduction achieved

PICTURE

Process overview:
Present the key design parameters (figures before and after), operating data.
Present a basic sketch illustrating your solution if relevant

SKETCH

Return of experience:
Present the challenge and difficulties encountered during development.
Present the resulting impact on terminal operations
Present the main risks / constraints
Present the co-benefits (other emission reductions

Elements of cost:
Present the CAPEX, the OPEX.
Present the economical benefits (lower tax, OPEX reductions).
Present the resulting cost of the tons of CO_2 avoided.

Reference & Contacts:
Any source of information (public report, brochure, videos..)
Contact point

Use Case n°1 : Solar-Assisted Thermal Heating for LNG regasification

Terminal	GNL Mejillones	Year of implementation	2019
Operator	GNL Mejillones	Scope concerned	Scope 1
Country	Chile	Reduction achieved (tCO_2/yr)	3,550–5,000 tCO_2/y

Technical description:

A hybrid heating approach for LNG regasification has been implemented by integrating high-efficiency solar thermal collectors into existing fuel-gas based Submerged Combustion Vaporizers (SCV). In parallel to the stand-alone water bath heating system, a new closed water heating loop has been added including 2+1 circulation pumps, HDPE piping and thermoplastic solar collectors. Depending on gas demand and solar energy availability, one vaporizer is able to run in solar mode only, in gas mode only or in hybrid mode (Solar+gas).

Context and origins:

The system benefits from the location in the Atacama desert, with high solar radiations and large free surfaces to cut gas costs and meet sustainability goals :

-Solar energy offsets the thermal load of one vaporiser during daylight summer hours, reducing operational costs by upto 5,000 USD/d by saving min 10% of the facility's energy and selling the surplus on the secondary market;

-By utilizing renewable thermal energy, the system lowers carbon emissions and supports compliance with ESG and carbon footprint goals.

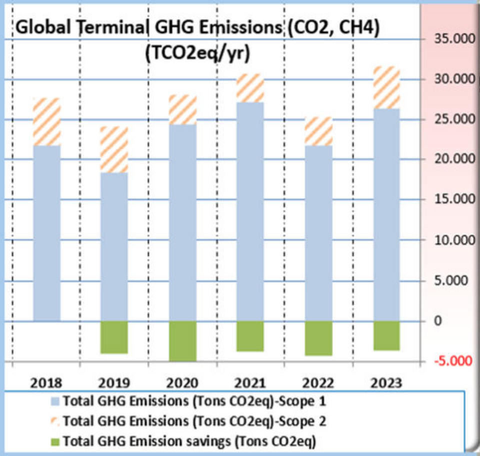
CO_2 reduction objectives (scope 1) :

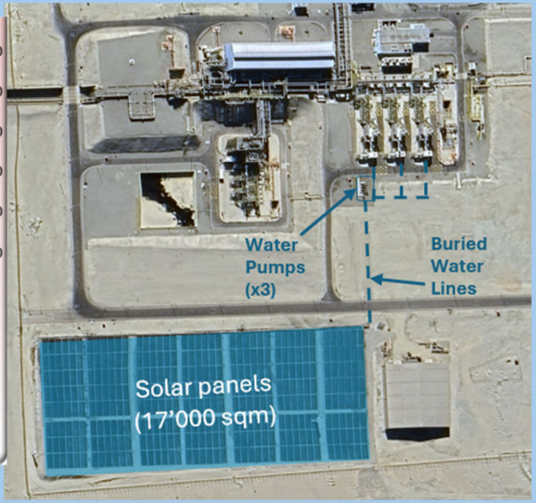
Reduction target :

-Produce 18-20 MW of warm water during daylight summer hours with a DT of 15°C
Produce 2 - 5 MW of warm water during night and winter days

-Reduce the yearly vaporizer gas consumption below 1% of the sendout capacity

-Save 5000 tCO_2/yr (or more than 15% of the GHG of the terminal)





Process overview:

Before :

3 SCV's vaporizing 90-100 t/h of LNG at 5°C with a bath temperature of 15°C ;

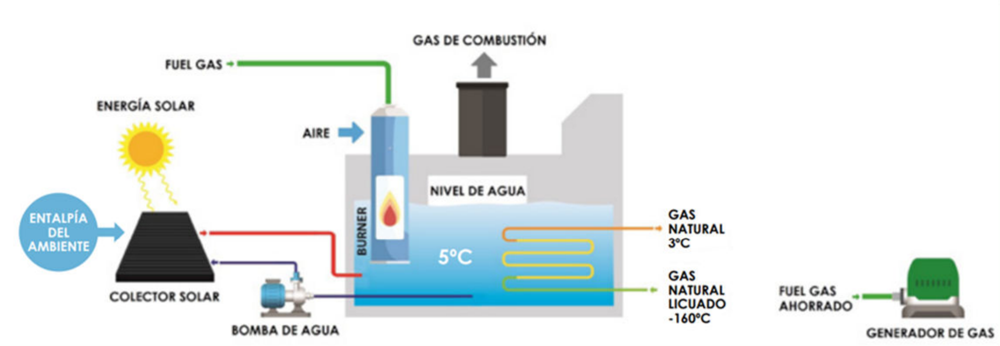
Duty : 17-20 MW/SCV – FG consumption : 1,1 to 1,3 t/h or 1,2-1,35% of regas flow

Intinuna Project

(2+1) 150 m3/h electric recirculation pumps, with 17,000 m2 of thermal collectors

Warm water distribution spargers below the LNG bundle

Modified SCV control logic and gas outlet temperature



Return of experience:

-Installation of the modular thermoplastic collectors on flat surfaces

-Difficult interface between HDPE pipes and Polypropylène collectors

-limited warm water loop availability

Elements of cost:

Capex : 2 MUSD ;

Limited Opex increase (Higher electric consumption) ;

Schedule : 10 mths for procurement and 6 mths for installation ;

Pay back : 2 years.

Reference & Contacts:

Contact point : GNL Mejillones / ECO-Energy

Way forward

- Template available on GIIGNL site free to use
- « Google forms » format more appropriate ?
- Recall 2 months before each TSG for initiative sharing
- Other suggestions ?

Any recent initiatives to share ?

- On Dunkerque LNG side,
- **Action #1:** Reduce fugitive emissions. LDAR campaign carried out on full site
- **Action #2:** Switch to low emission flare pilots. Planned for 2027 yearly shutdown.
- **Action #3:** Switch road lights to LED
- **Action #4:** Feasibility study initiated to supply shore power to the Stand-by tug on duty during unloading operations.
- **Action #5:** Installation of EV charging stations on Photovoltaic shade structures on terminal public parking (French law requirement)
- **Action #6:** Study to install VFD on Sea Water Pumps (4x25% + 1)

SPARE SLIDES

WG members

Company	Name	Email
DUNKERQUE LNG	Sylvain PLANTELINE	s.planteline@dunkerquelng.com
ENAGAS		
ENGIE		
SEMPRA INFRASTRUCTURES		
SHELL		
TOTALENERGIES		

Questionnaire Preliminary Findings Scope 1

- Questionnaire submitted on May 13th.
- **12 replies received** : Asia (6), Europe (4), America (2)
- **7 members shared their full emissions results**. Great gap in results reflecting the differences between our installations and their use.
- **For 8 members, CO_2 represents more than 50% of total scope 1 emissions.**
- For 2 members, CH_4 is responsible for the majority of scope 1 emissions
- **Scope 1 CO_2 emissions : Ratio of 280 between highest and lowest declarations.**
- 1^{st} emitter : SCV (4) / 2^{nd} emitter : Fugitives emissions (3) , Flare (3)
- **8 members have already implemented CO_2 reductions actions and all members are studying reduction actions.**
- **7 members are ready to share their experience** in a dedicated report.

Scope 1 reduction actions mentioned

- **On SCV:**
  - Use of solar panels to reduce consumption
  - Burner efficiency / Study : H2 green as burner fuel
  - Review testing
- **On Flare:**
  - Switch of sweep gas and flare header blanketing from gas to nitrogen
  - Green H2 as pilot
  - Study : switch to low consumption pilot or on a pilot on demand system
- **On fugitive emissions :**
  - LDAR campaign
- **Others** : site electrical vehicles, solar PV on roofs for electrical production

Questionnaire Preliminary Findings Scope 2

- Less replies for scope 2
- Great variability on ratio vs scope 1 : From 0% (green electricity supply) to 291% (low emission terminal)
- 7 members have implemented or are studying scope 2 reduction actions.
- 3 members only are ready to share experience
- Scope 2 reduction actions mentioned:
  - Installations of VFD on LPP, HPP, SWP
  - Turboexpander
  - LED lighting on site
  - Green electricity supply contract

Draft Table of Content

- **For discussions following survey**
- Scope 1/2/3 to be covered ?
  Limit to Scope 1 only ?
  Cancel Scope 3
- Minimum number of case studies for the final report ?
  Several cases still under study.
  Initiative database vs formal report ?
- Sufficient real cases existing for the time being ?
- Case study presentation might follow the same template used for terminal and PP integration