Dunkerque LNG Terminal Project

Presented by Sylvain Planteline

Dunkerque LNG
GROUPE EDF

Project Background

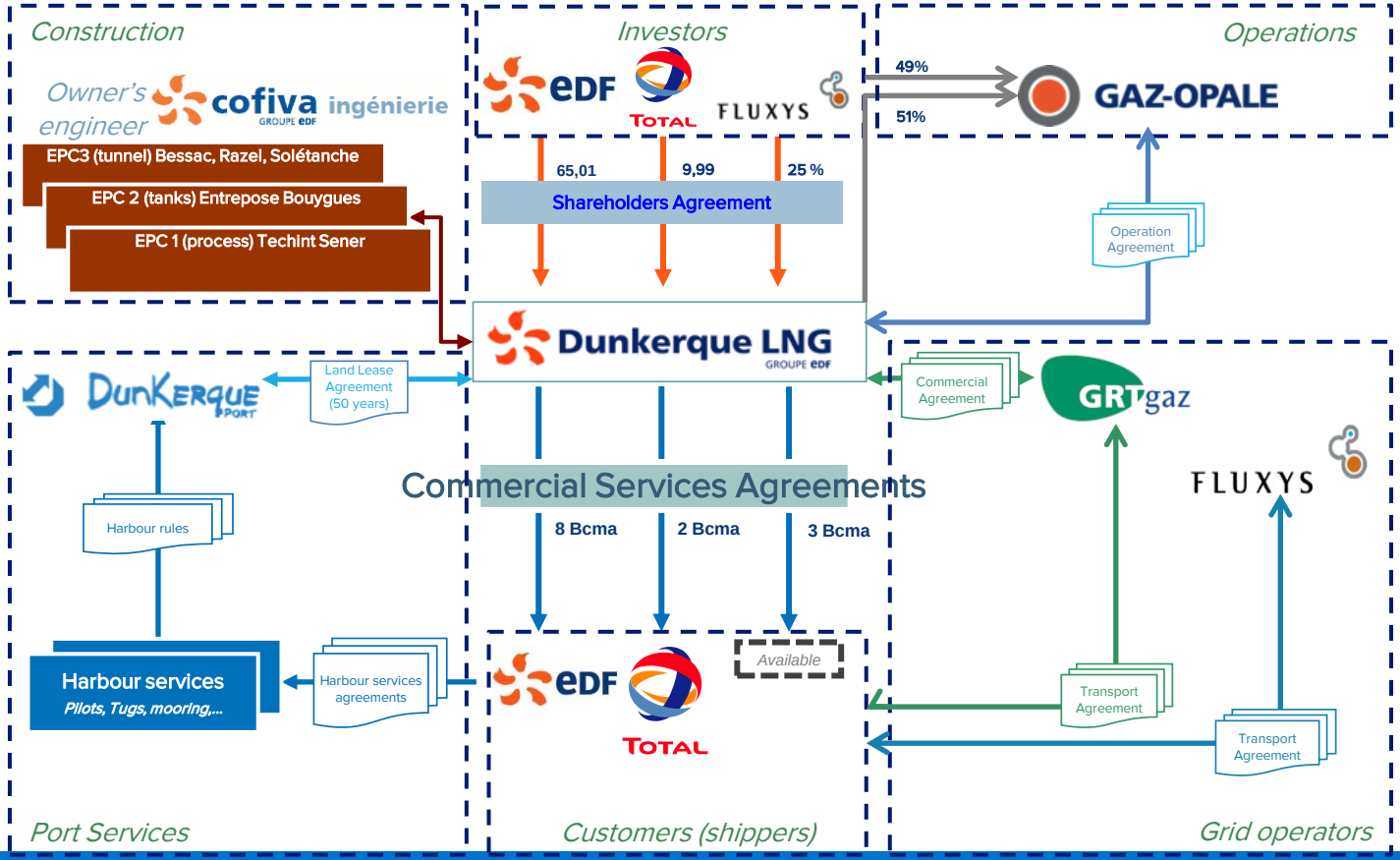
- Since 2006, EDF and Dunkirk Port have been jointly developing the project for a LNG regasification terminal
  - In 2005, EDF made an analysis on eligible sites to develop a LNG terminal in France. Dunkerque has been considered as the most adapted site.
  - In 2006, Dunkirk Port launched a tender for the development of an LNG terminal and EDF was selected in October 2006 to develop feasibility studies of LNG terminal in Dunkerque

- Following a public consultation in 2007 and the receipt of tenders for construction in 2009, the viability was confirmed
  - The project could offer a competitive tariff comparable to other terminals in Northwest Europe provided a minimum 10 bcma re-gasification is sold on a long term basis, regarding the economies of scale

- 5 bcma of capacities were proposed to the market in 2010 and 2011

After a 5-year development, EDF decided to invest 1G€ for the construction of a 13 Bcma regasification terminal together with 2 industrial partners

Main Contractual Interfaces



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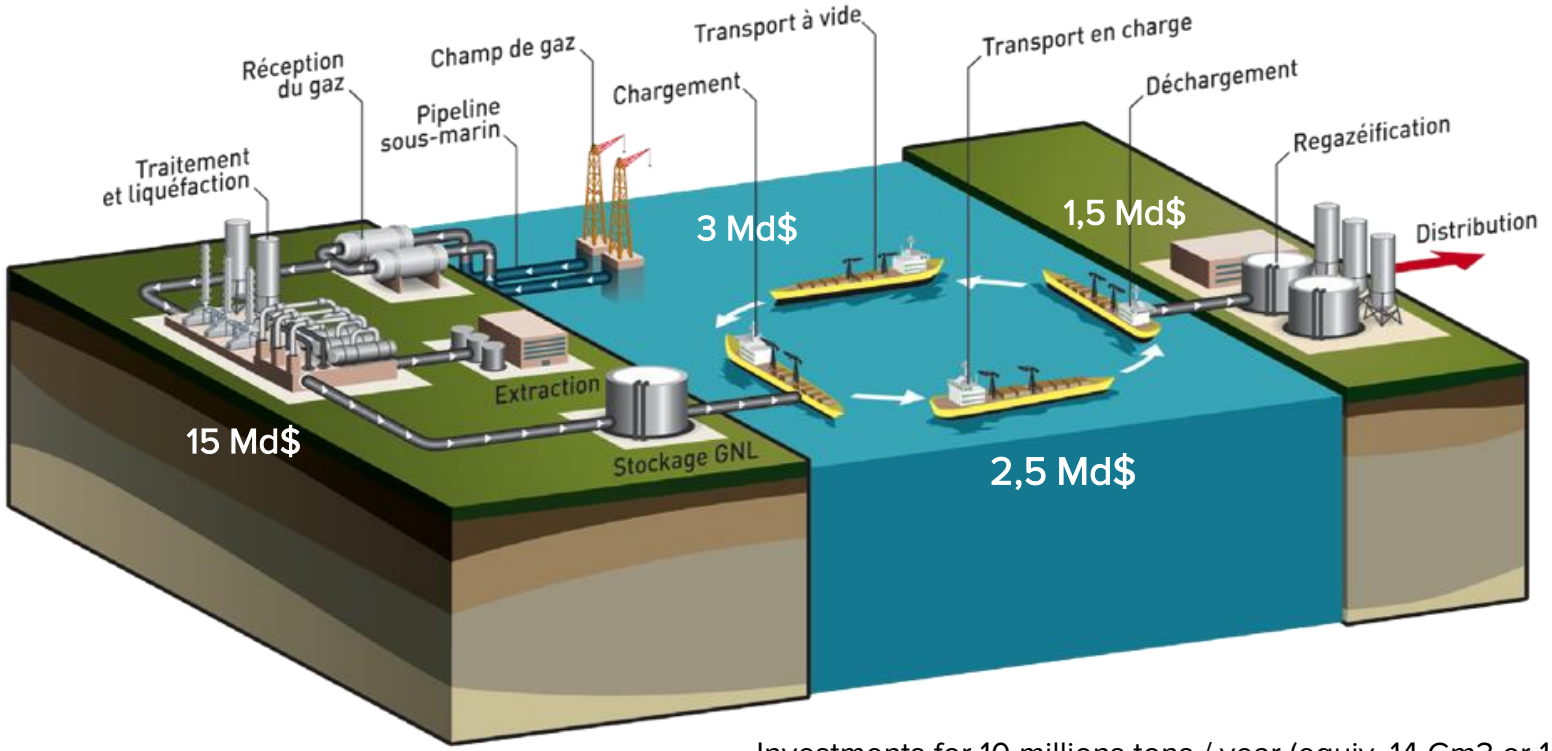
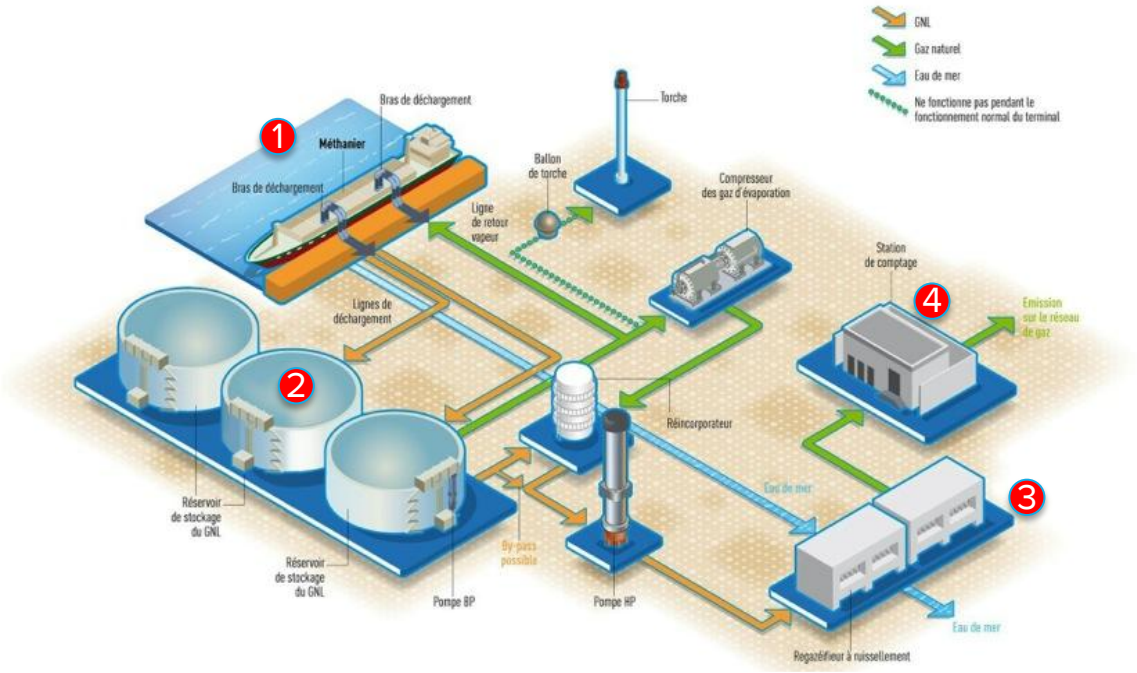
Some rough estimates : regasification terminal represents about 10% of the LNG value chain.



Investments for 10 millions tons / year (equiv. 14 Gm3 or 150 TWh)

A reliable industrial model : 4 steps process



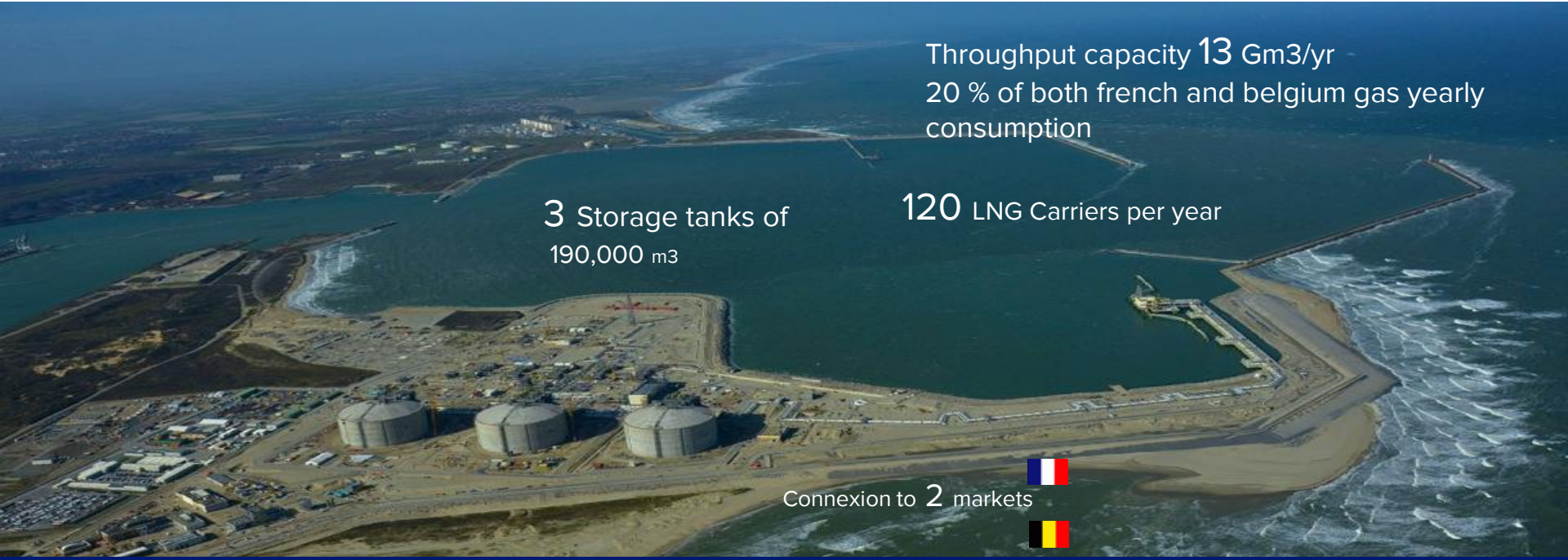
1. Unloading

2. Storage

3.Regasification

4.Metering & Sendout

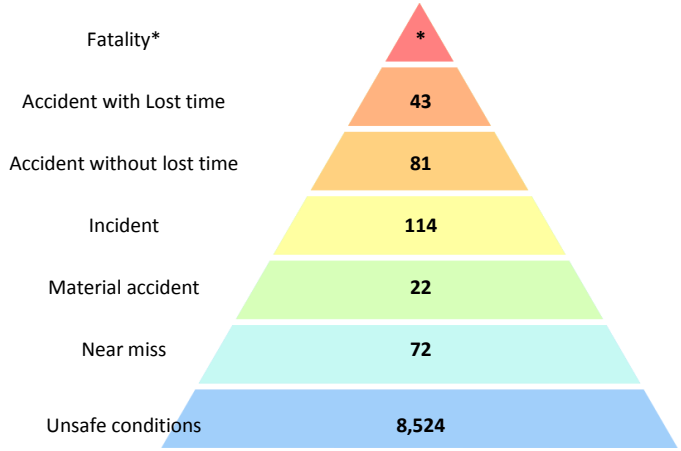
3rd construction site in France « on time, on budget »



- **Industrial start-up at the end of 2015 after 4 years of works. The reception of the first LNG carrier for commissioning is planned for October. First commercial operations are planned for beginning of 2016**
- **Final cost is still planned at 1 G€, in conformity with budget approved by shareholders in June 2011**

Main installations under construction

Safety first



* Décès suite malaise cardiaque en juillet 2014

Tf (global projet)
5.35
Tf (12 mois glissants)
3.5
TG
0.31

8,0 millions working hours

1,774 workers on site

- Continuous improvement of frequency rate (Lost time incident)
- Main risks under control: radiographic tests, confined space, electrical works, working at height, lifting works, …
- Inflexion of risk management towards new arising risks linked to start-up activities : gas, cold burn, oxygen depletion, …
- High consideration on safety since contract elaboration (1 HSE superintendent for 50 workers, maximum 2 sub-contracting levels, HSE requirements, MASE qualification…)
- High potential gravity situations, all deeply and thoroughly analyzed

Site before construction

Site end of April 2015

Storage Tanks Construction: 93.5% progress

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Process Installation : 86.9% progress

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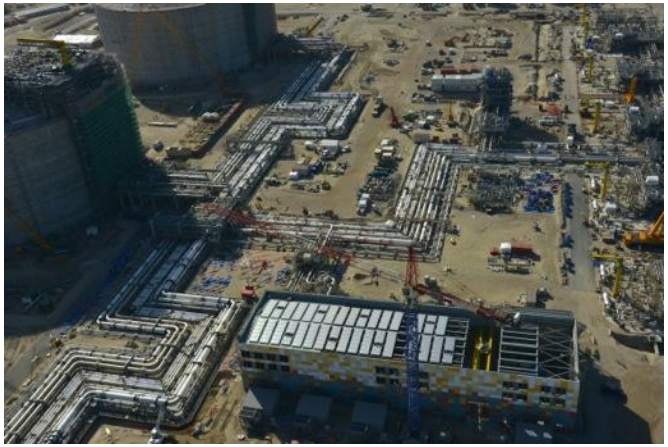
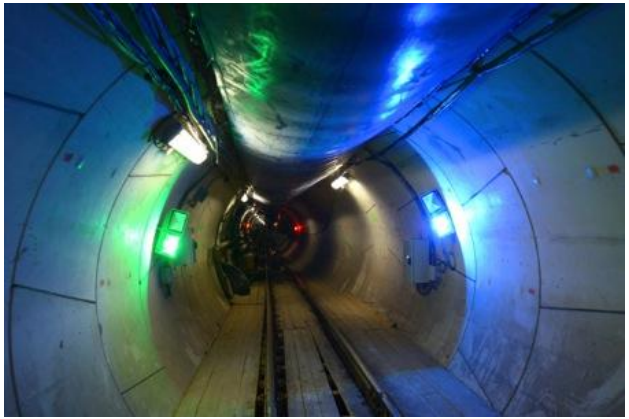


Tunnel : 96.6% progress (boring : 100%)



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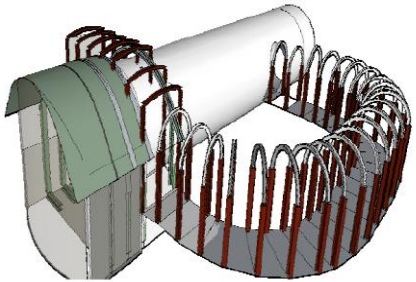
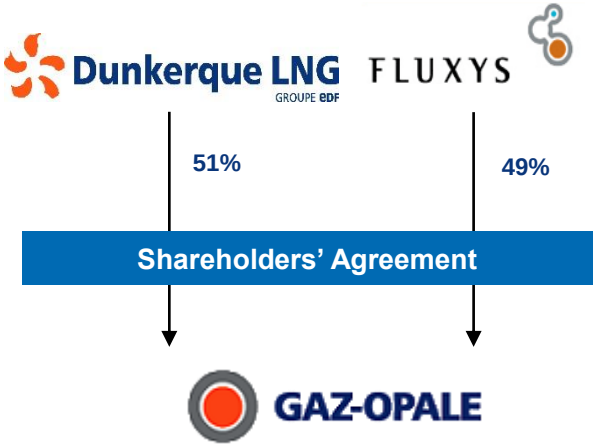
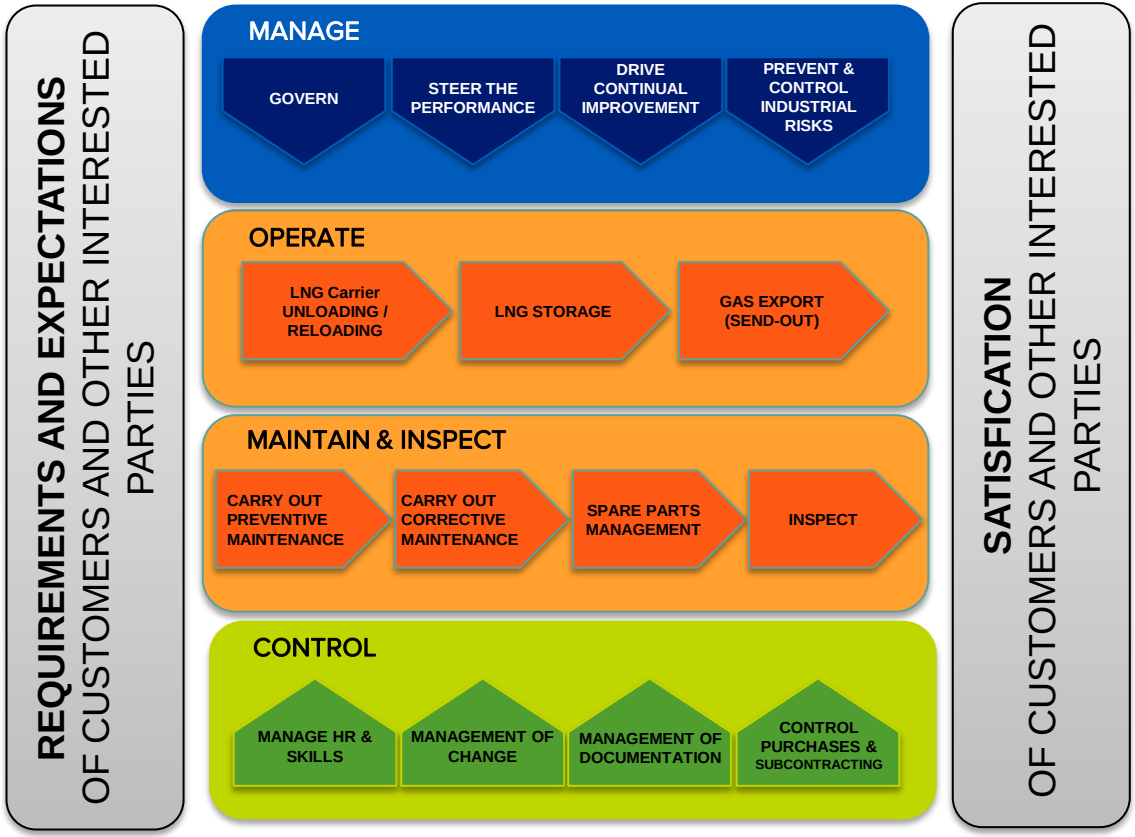


GAZ-OPALE, the Terminal Operating Company

- The Operating Company is in charge of operations of the terminal
- JV implemented in June 2011 with a skilled terminal operator for ensuring a construction of a plant which will meet high operating standards
- Fluxys brings technical expertise and secondees (3 key persons such as Deputy Terminal Manager, maintenance Manager and Technical staff Operation)
- Permit to Operate remains (for the base case) in the hands of Dunkerque LNG
- Huge opportunities
  - Competent organization for a safe, secure and efficient operation perspective
  - Valorization of competences, experience and know-how from the LNG Terminal of Zeebrugge
  - Potential development in the future services between Zeebrugge and Dunkerque LNG terminal (70 km)



GAZ-OPALE Management System

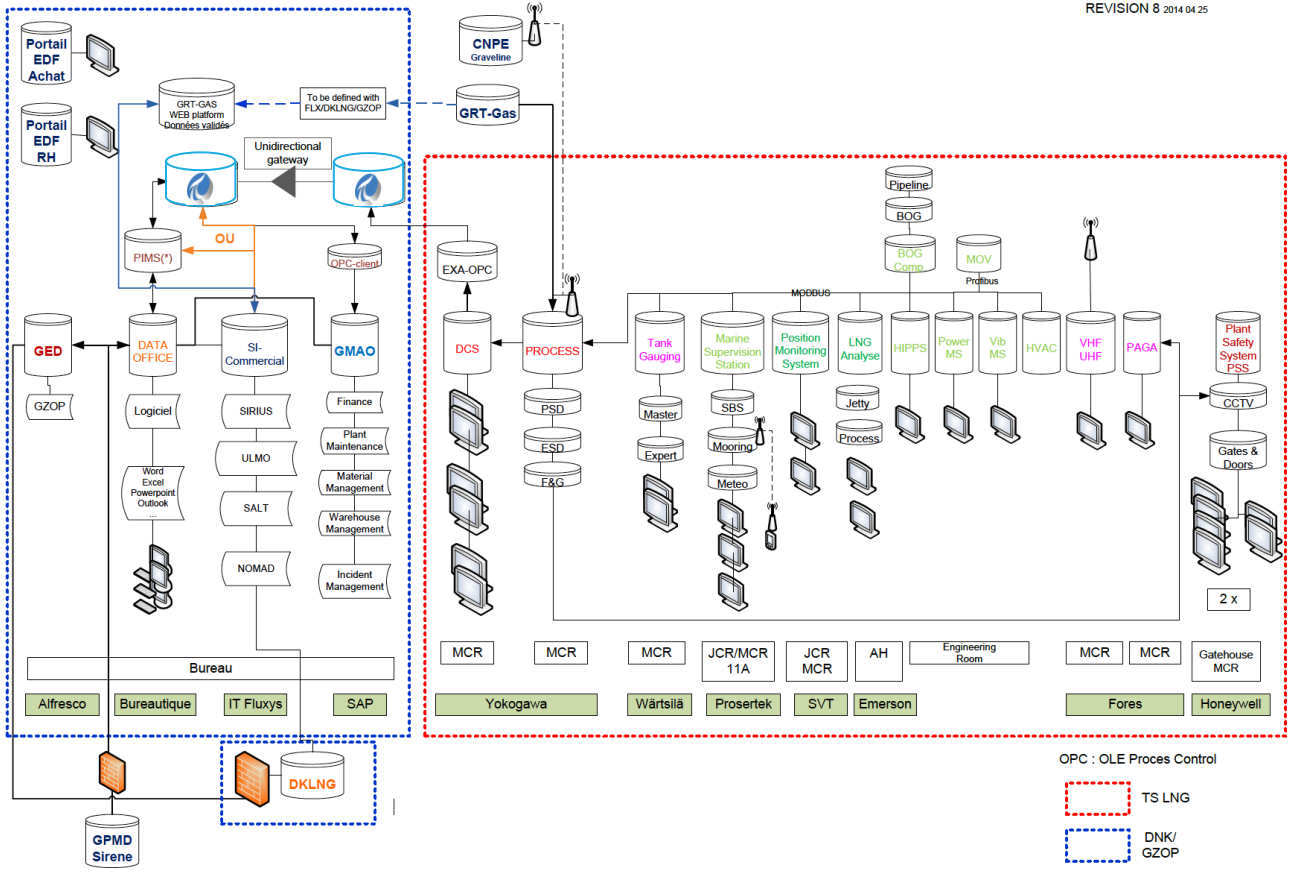


GAZ-OPALE KPIs

Gaz-Opale performance is evaluated through several Key Performance Indicators

- TERMINAL BUDGET KPI
- TERMINAL SAFETY KPI
- SERVICES KPI
  - LAYTIME KPI
  - PLANT AVAILABILITY KPI
  - PLANT RELIABILITY KPI
  - ENVIRONMENTAL KPI
- ASSET PRESERVATION KPI
  - 1 YEAR ASSET PRESERVATION KPI
  - 5 YEARS ASSET PRESERVATION KPI
  - UPDATED DOCUMENTATION KPI

IT Architecture



What the PI system Infrastructure could bring us ?

- Urgent needs linked to commercial operation. Feed Commercial IT System.
- Assistance and situational awareness for operators (performance gauge widgets, manual logger…)
- Operations follow-up (automatic spreadsheet for daily reporting, shift performance assessment, …)
- Maintenance management in relation with our CMMS
  - Maintenance KPI (MTBF, MTTR, MPDT, MUDT, Availability,…)
  - Failure analysis
  - Maintenance division workload and performance (manhours spent/WO, ratio per type of maintenance,…)
- Plant thermal performance analysis
- KPI Management
- Automatic Reporting (daily, monthly, yearly)
- External access to plant key process indicators for management team
- Real time overview of plant performance for Commercial dpt and Shippers
- …

In Conclusion

We are here today to feed our reflection and learn about best practices…

See you in the upcoming years to share what we have developed…

Thank you for your attention.

Sylvain Planteline

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Project Engineer

Gaz-Opale

Questions

Please wait for the microphone before asking your questions

State your
name & company

THANK YOU