The undergrounded HVDC interconnection line between France and Spain

BAIXAS – Santa LLOGAIA

Jicable

Perpignan, November 20th 2013

Current France-Spain interconnection

4 interconnection lines : 2 of 225 kV, 2 of 400 kV

Last interconnection line built in 1982 !!

The current exchange capacity is quite limited …

Maximum exchange capacity between France and Spain is 1 400 MW

An interconnection ratio of 3,5 % for Spain, much lower than the European target of 10 %

An exchange capacity that becomes lower with the increasing domestic supply

Needs for France-Spain interconnection using are increasing : for European electricity market developing, for Spanish electricity wind-power production promotion, ...

… and therefore has to be increased.

France-Spain interconnection reinforcement has been qualified as "European Prioritary Interest" project by the European Energy Council in 2002

Various successive projects …

The overhead 2*400 kV line CAZARIL – ARAGON project has been cancelled in 1996

Many studies for reinforcement of existing lines

Project of an overhead 2*400 kV line between BAIXAS (Perpignan) **and BESCANO** (Gérone) **:** public debate in France in 2003 – Project rejected by ministery

… before France and Spain asked for an European mediation, after the France-Spain Gerona summit in November 2006

and before the current project …

M. Mario MONTI was named European Coordinator in September 2007

He met all national, regional and local actors, asked for external expert studies (CESI), and gave his recommendations in June 2008

The Zarragoza France-Spain summit validated these recommendations and ratified an intergovernmental agreement on June 27th 2008.

The intergovernmental agreement dated June 27th 2008 states with the main technical characteristics of the new electric interconnection line between France and Spain

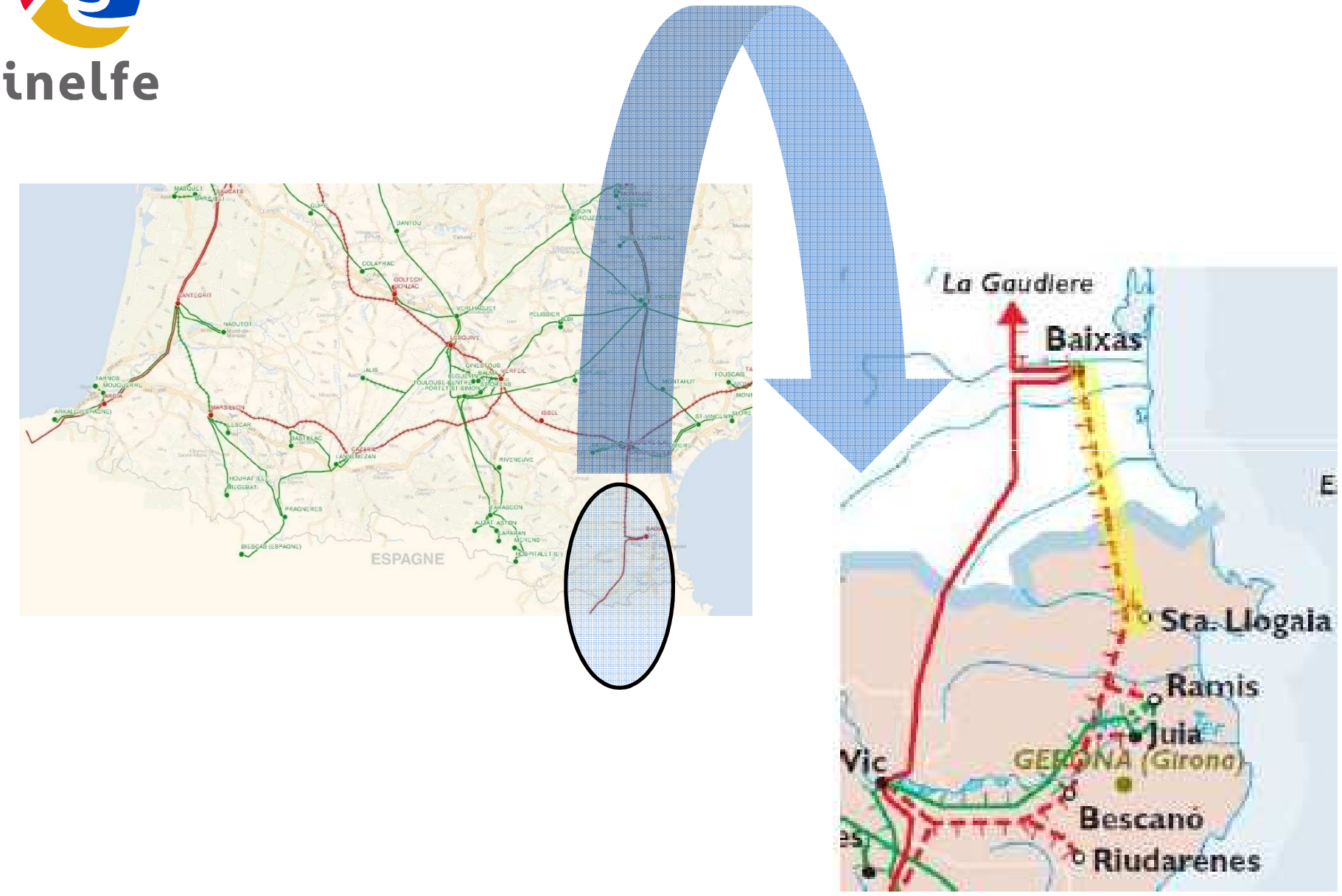
The Zarragoza intergovernmental agreement ....

✓ ***describes the main technical characteristics of the new project …***

- **a completely undergrounded line from the existing substation of Baixas (near Perpignan) to Santa Llogaia (near Figueras)**
- **in Direct Current**
- **with a route as close as possible to other existing infrastructures' routes**

✓ ***… decides the creation of a common company between RTE and REE : INELFE (INterconnexion ELectrique France-Espagne)***

- **to facilitate and make sure coherent technical choices and decisions**
- **in charge of all the studies and the engineering of the construction of this new project**
- **with a 50 % - 50 % allocation of the expenses between RTE and REE**


ESPAGNE
La Gaudiere
Baixas
Sta. Llogaia
Ramis
Juia
Vic
GERONA (Girona)
Bescanó
Riudarenes

The INELFE project

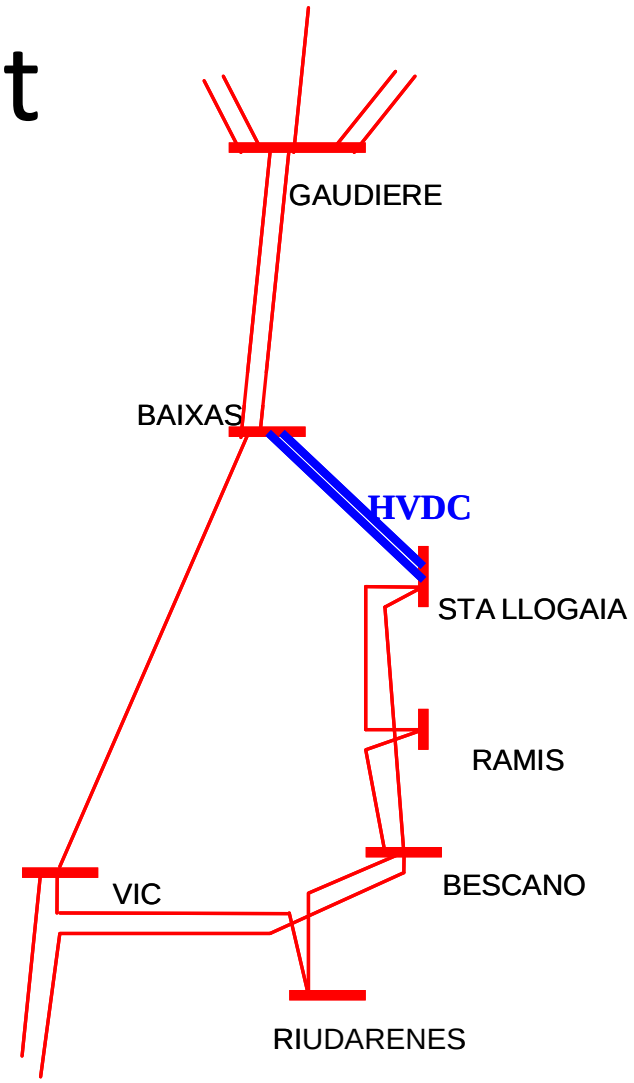
A double HVDC link

- 2 x 1000 MW
- ± 320 kV

Length 65 km (33 FR + 32 ES)

Converter stations in :

- Baixas
- Santa Llogaia



This new interconnection line will double the total electricity exchange capacity between France and Spain : 1 400 → 2 800 MW

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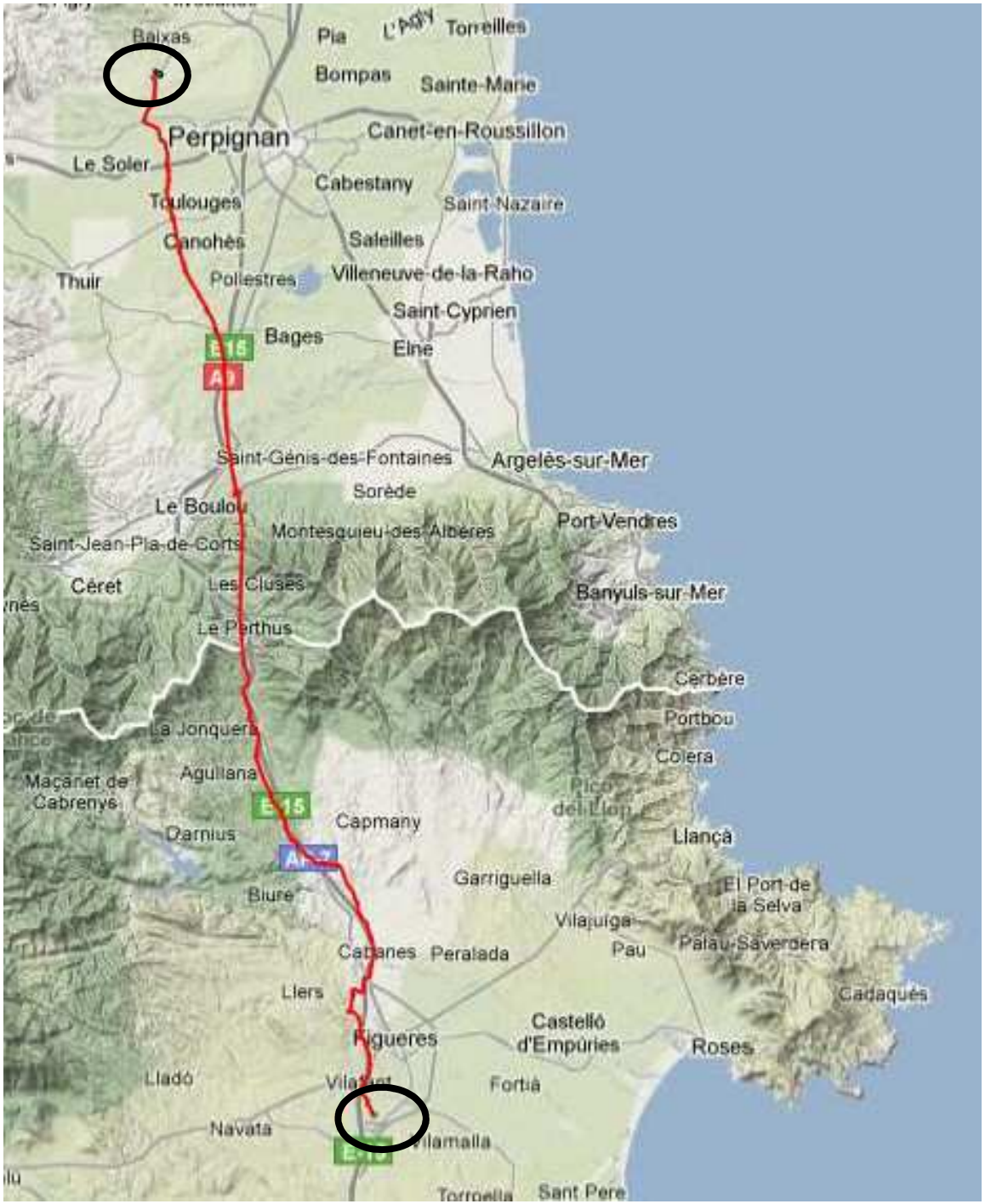
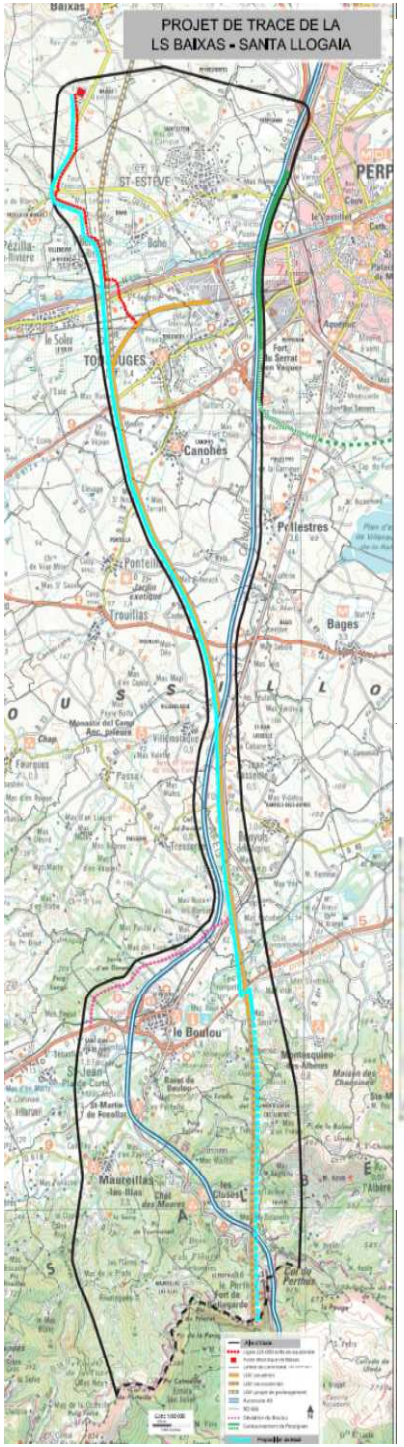
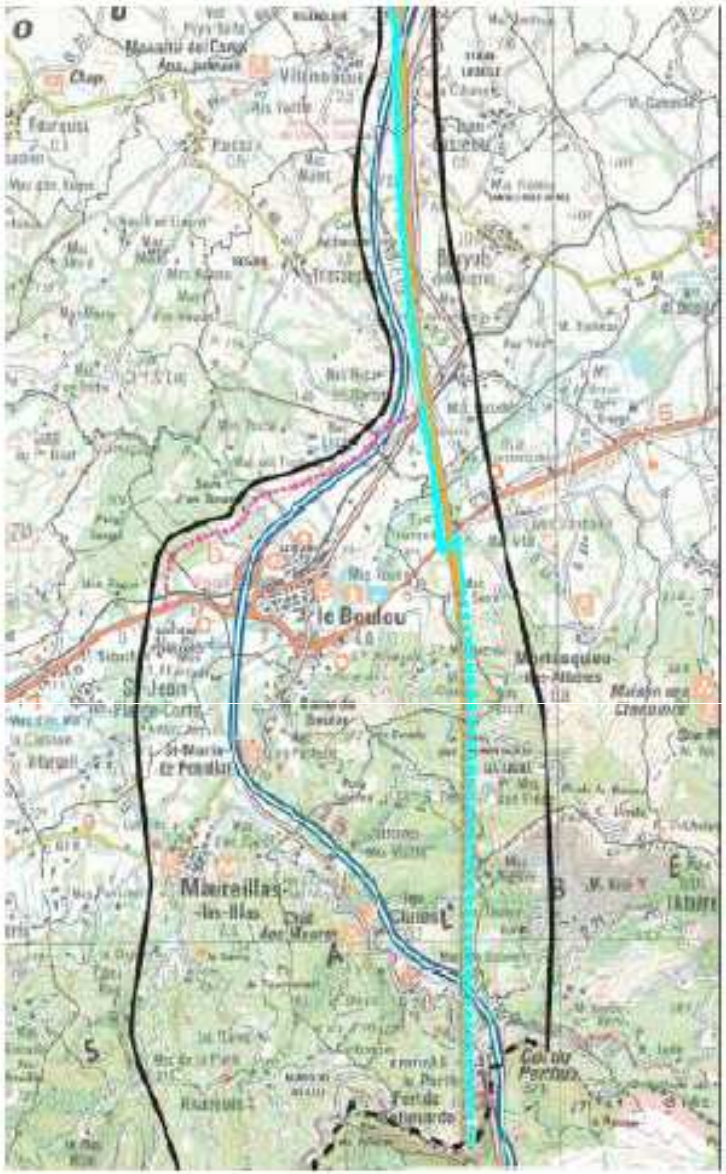
Baixas - Santa Llogaia route







Route of the French part of the project

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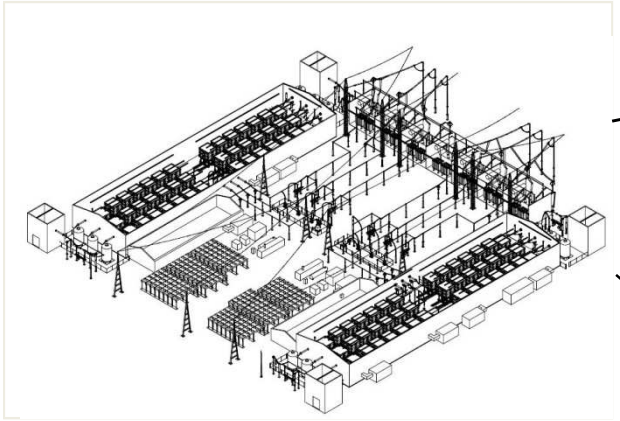
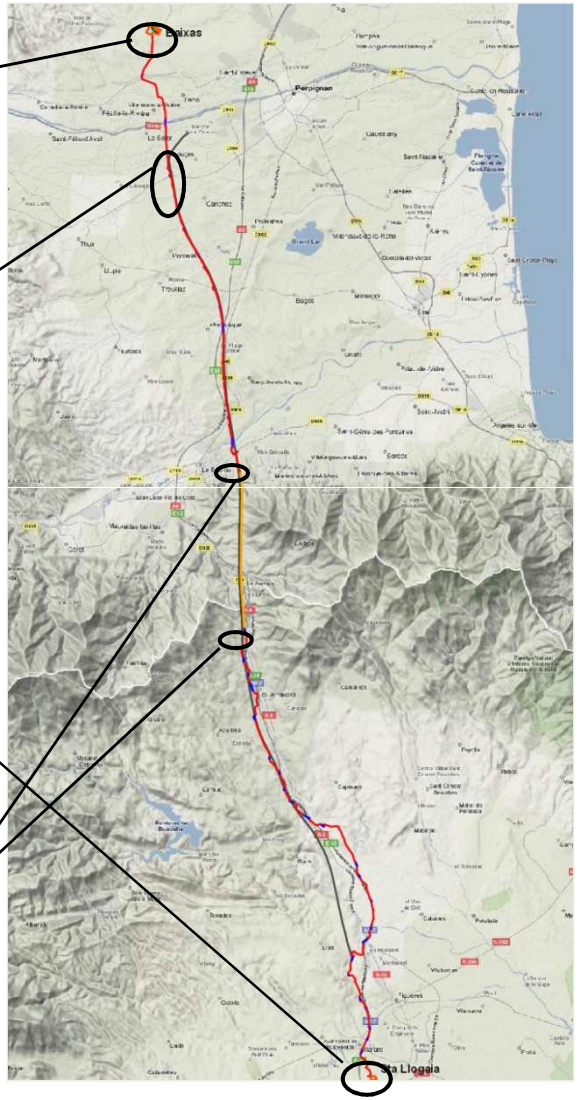
DC / AC Converter Station

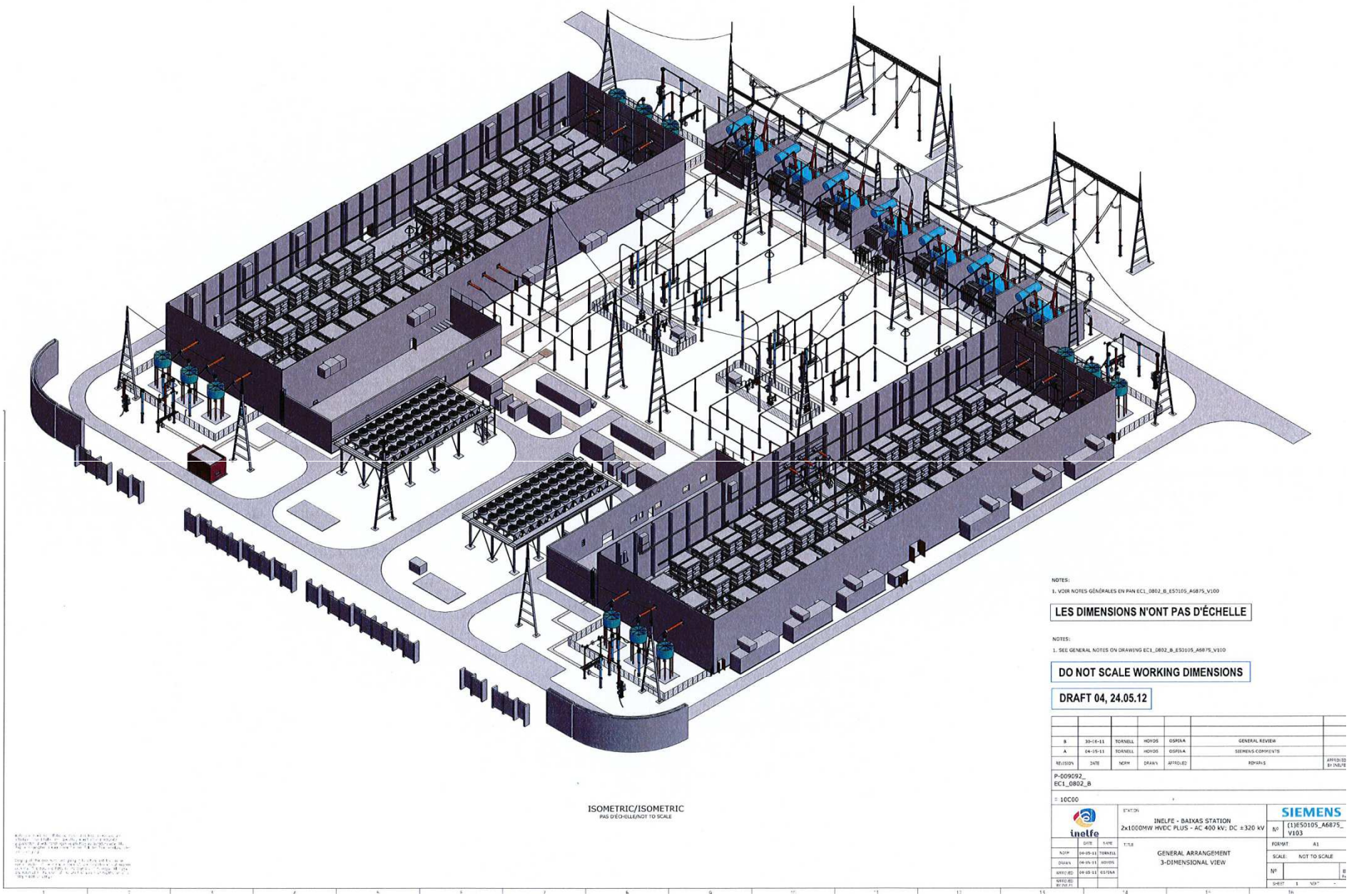


Route of the undergrounded line along High Speed Railway (France and Spain), and along motorway (Spain)

Tunnel to cross Pyrenees
Length = 8,5 km

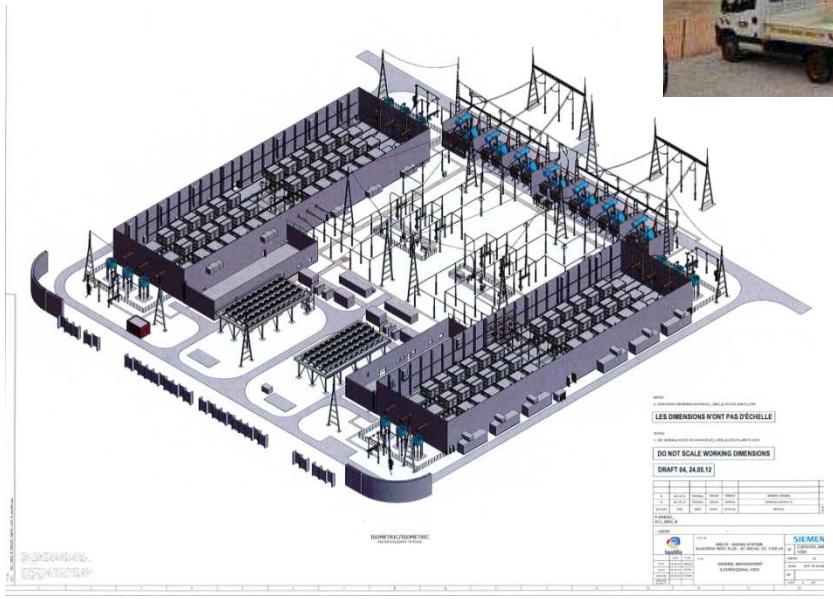


Baixas Converter Station



Schematic view of a Converter Station

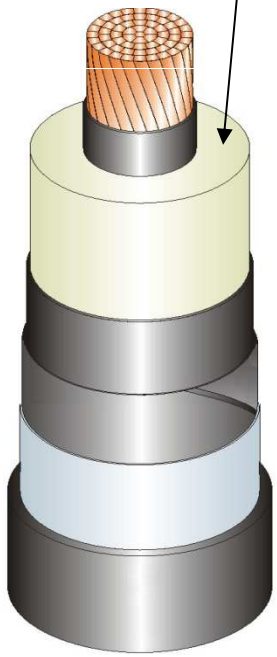
Works in Baixas

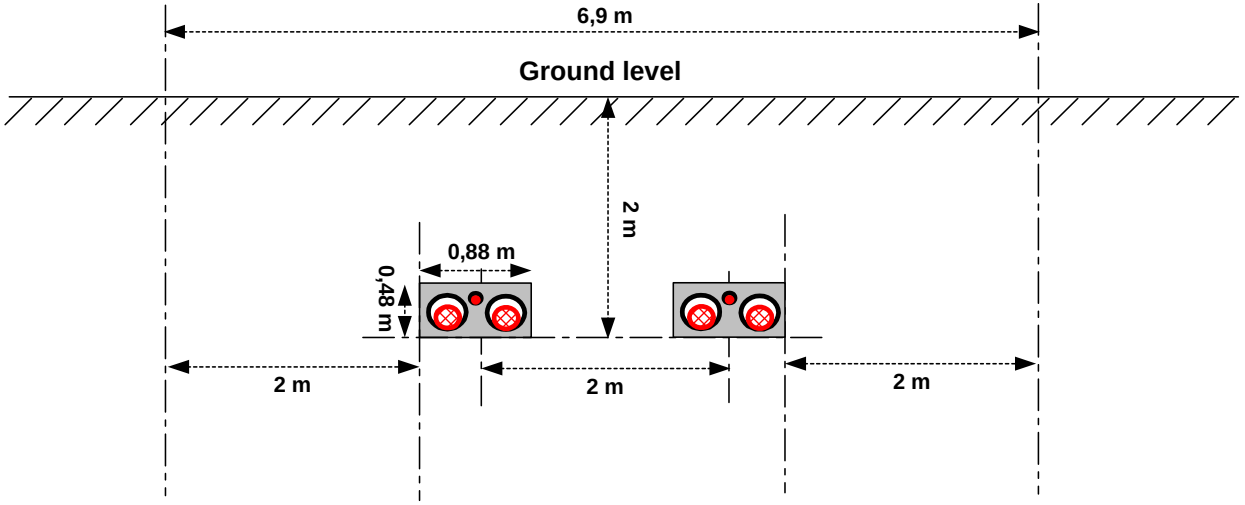


Works in Santa Llogaia

Undergrounded line – Cable

XLPE insulation



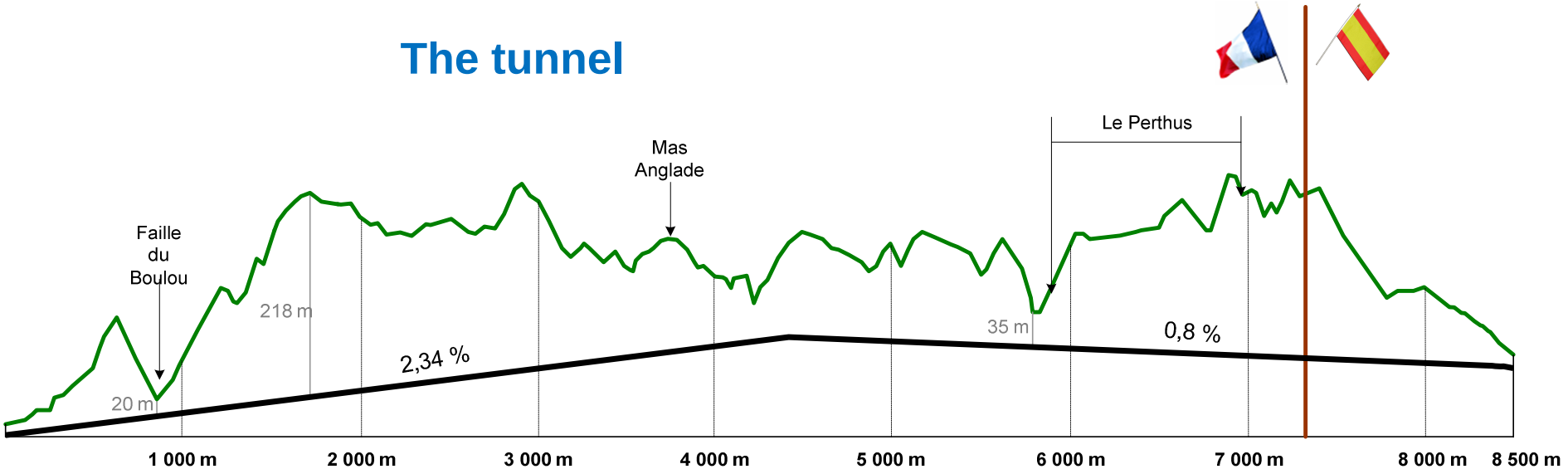


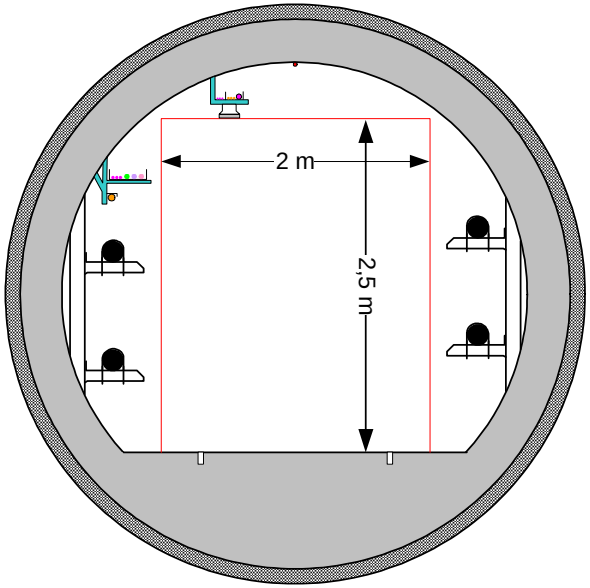
- Length of the undergrounded line between BAIXAS (Perpignan) and Santa LLOGAIA (Figueras) = 65 km
- Direct Current : AC / DC Converter station at each end
- Power 2 000 MW (2 x 1 000 MW)
- XLPE insulator cable
- VSC Technology (Voltage Source Converter) for the converter stations

The undergrounded line civil works

Cable laying

The tunnel





- Length : 8 500 m
- Inner diameter : 3,5 m
- Internal equipment : *lightning, ventilation, control, internal communication system, rails for maintenance vehicle, ...*

Tunnel works

4 world records

- **World record for the length of a terrestrial undergrounded line (65 km)**
- **World record for the operating voltage of an XLPE DC cable (320 kV)**
- **World record for the power of an AC/DC VSC technology Converter Station (1 000 MW)**
- **First time for a HVDC line operating in parallel with other AC lines**

Total budget 700 M€ :

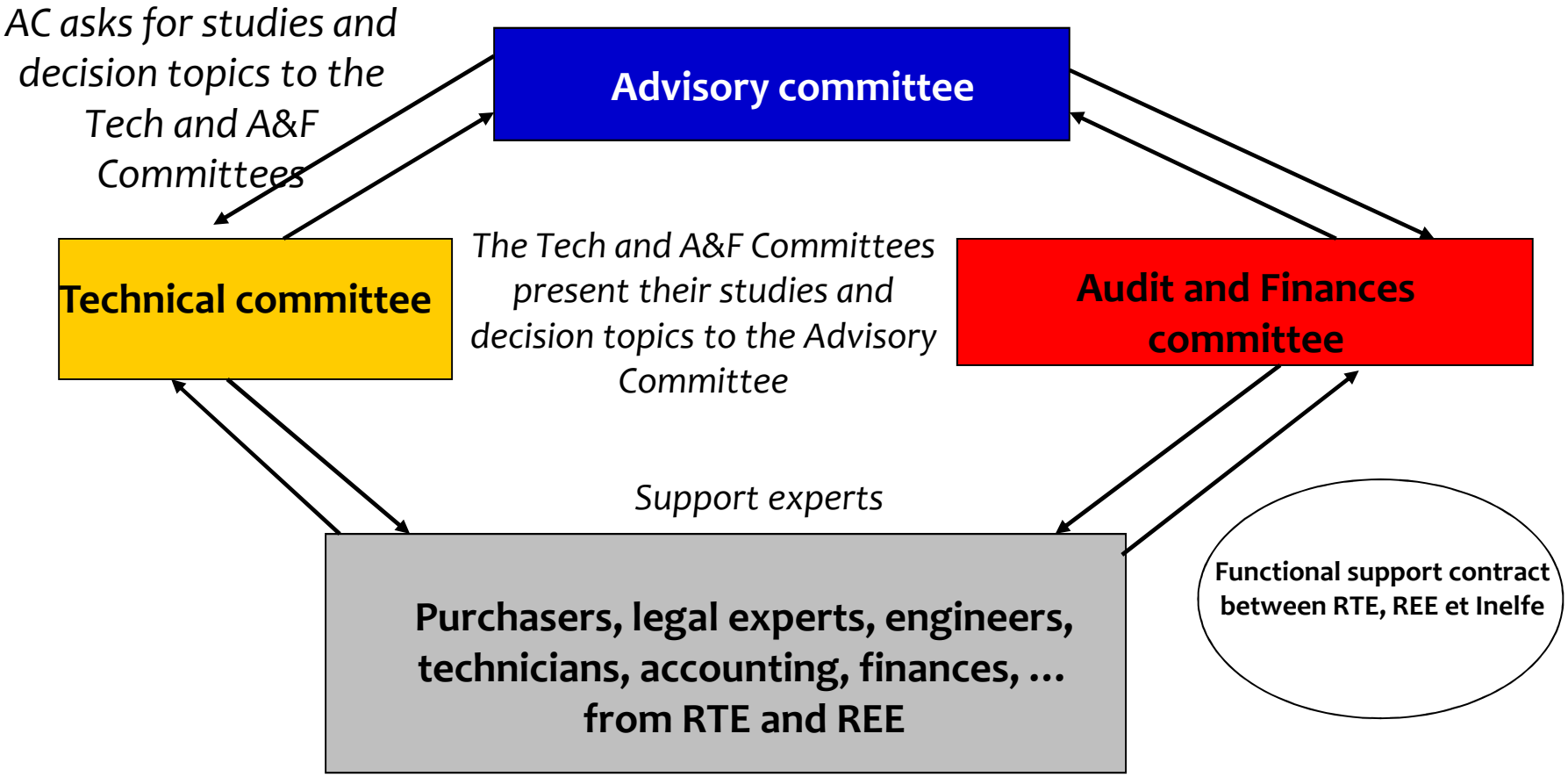
- 225 M€ from European funds *(EEPR = European Energy Plan for Recovery)*
- Loan from EIB : 350 M€
- Financing 50 % - 50 % by French and Spanish TSO (Rte and REE)

Schedule :

- Tunnel works from mid 2011 to end of 2013 *(both TBM met on April 22nd 2013)*
- Undergrounded line civil works and drillings from mid 2012 to mid 2014
- Cable laying with junctions : in the trenches from April 2013 to September 2014, in the tunnel from beginning 2014 to mid 2014
- Converter stations works from end 2011 to mid 2014
- Tests from mid 2014 to end 2014
- Commissioning end 2014 / beginning 2015

INELFE Governance

Created on October 1st 2008
President : Carlos COLLANTES
General Manager :Yves DECOEUR
Committees : 3 members REE, 3 members RTE



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Thank you for your attention ….