



Réseau de transport d'électricité

Case Study Experiences in France

RGI Cable Workshop

February 13 2013

A little bit of history



Overhead lines versus underground cables

RTE is striving to provide a technical, environmentally sound response to consumption and production evolution , within reasonable costs and timelines.

Until 2000, the grid was obviously mainly developed above ground : it cost less to the community and it was a proven technology with rather few individual opposition. Underground cables were strictly implemented in dense urban areas.

But, little by little, powerlines began to become controversial and the « reasonable cost and timelines » to drift.

As the need for grid remained, RTE had to take a turn in order to fulfil its public service mission. This turn was taken around 2005.

Undergrounding became a real alternative
and complementary technology to overhead lines.

Issues and commitments

❖ Technological impediments

Undergrounding is not possible for very high voltage powerlines due to the capacitive effect of the cables. The higher the voltage, the more difficult the undergrounding.

❖ Acceptance

Growing public awareness on environment, NIMBY attitude in association with a wide use of Internet are key factors that foster opposition on grids.

Major consequences on OHL development are :

- Increasing cost
- Increasing time

❖ The public service contract (2005)

Since 2005, RTE has to stick its commitments with the authorities and in particular :

- Underground at least 30 % of new high voltage lines (63kV / 90 kV)
- Promote the use of underground cables for higher levels of voltage
- Not to increase the total length of overhead grids

Where are we now ?

❖ Technology

- HV : undergrounding is now possible in open fields
- 225 kV : France is the european leader with more than 1000km underground grid implemented
- 400kV : undergrounding AC lines is still hardly possible on long distances (≈ 30 km max)

❖ Time

Permitting procedures are shorter for underground cables than for OHL.
As social acceptance is better too, the dialogue phase lasts less and in the end, it appears quicker to build underground grid.

❖ R&D

RTE is actively involved in research for improving the technical and economical feasibility of this kind of projects :

- in the early 60', it was the first to use synthetic insulation cable
- it contributed to cable standardisation
- it worked out reducing civil works by optimizing the cable implementation

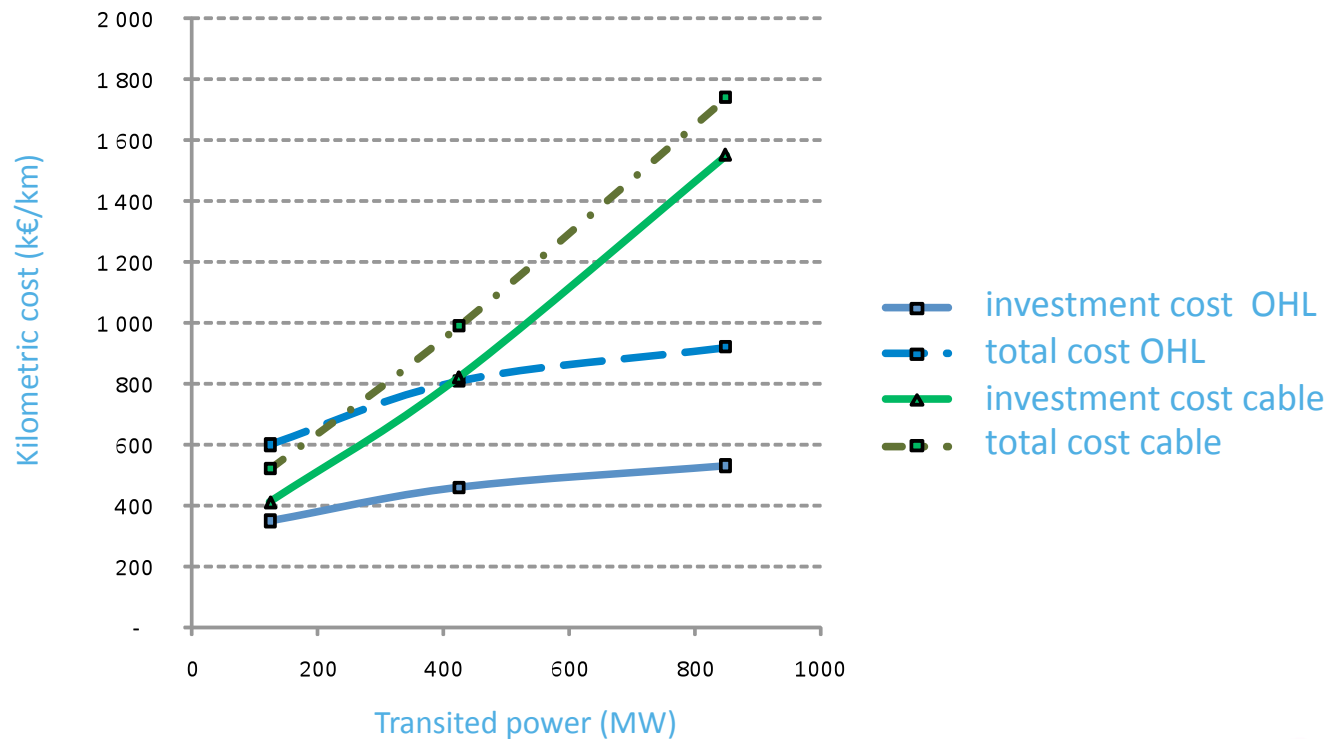
Where are we now ? Costs

As RTE promotes the use of underground cables, prices have been decreasing.

Overhead/underground ratio in total costs :

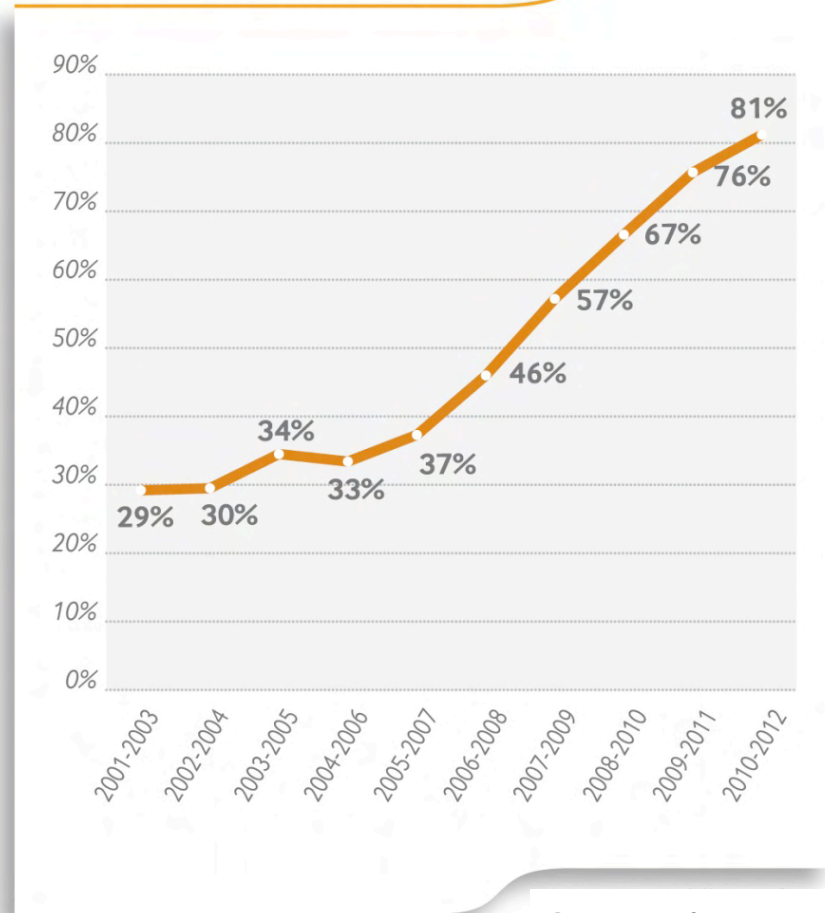
- average 0,85 for 90 kV
- between 1,2 and 2 for 225 kV

Comparison of overhead / underground powerline cost in rural areas



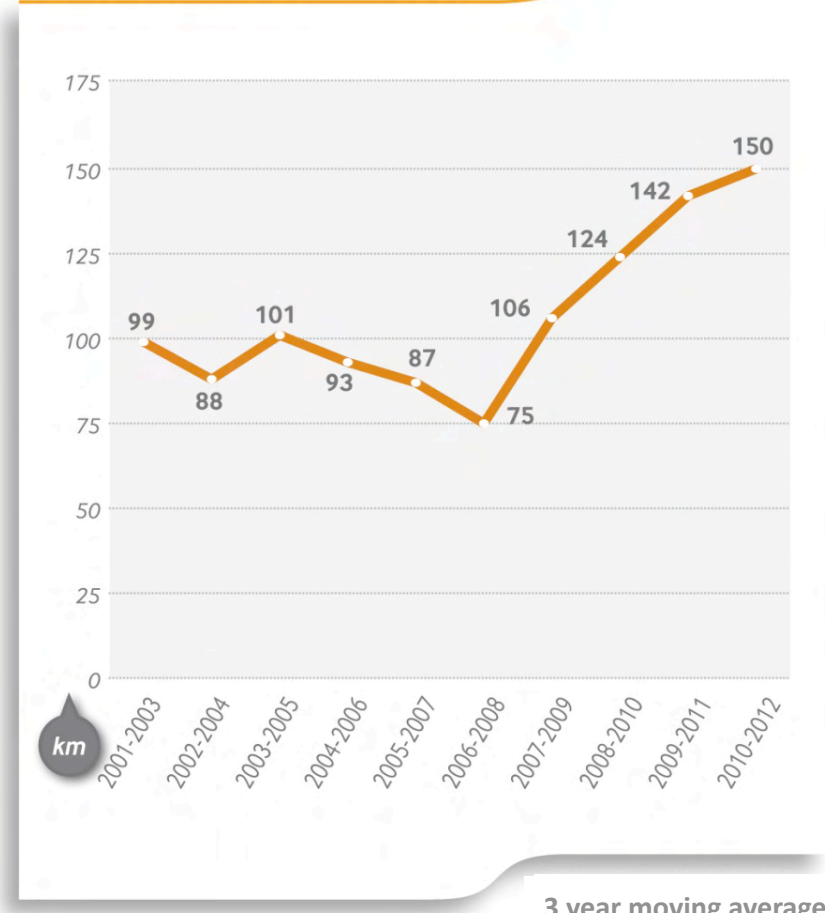
Where are we now ? – Public service contract - 1

Undergrounding rate for new 63kV and 90kV lines



3 year moving average

New 63kV and 90kV underground cables



3 year moving average

Where are we now ? – Public service contract - 2

Total length of overhead grid

400 000 volts



225 000 volts



< 225 000 volts



Total all voltages



Excluding the french railway grid that has been integrated in 2010, for 3 761 km HV.

Hindrances to a generalization

❖ From high to very high voltage

Costs of VHV underground cables still remain much higher than overhead lines ones. There are no real technical gaps to be found yet and the only effective lever is a market effect on supply and demand for 225 kV level.

RTE is implementing 320kV DC underground and submarine lines but they are so expensive that their use remains exceptional.

❖ Social acceptance

As the use of underground cables increases, their social acceptance decreases. Now RTE has to face opponents to undergrounding, especially in urban areas.

- Fear of magnetic fields is source of oppositions.
- In rural areas, farmers often prefer overhead lines built alongside their parcels rather than underground cables.
- For VHV power lines apart from urban areas, elected representatives may prefer overhead grid because of towers taxes.

The logo for Rte (Réseau de transport d'électricité) features the letters 'Rte' in a stylized, blue, sans-serif font. The 'R' and 't' are connected, and the 'e' is a simple, rounded shape.

Réseau de transport d'électricité

Thank you for your attention