



Grid infrastructure role in delivering National Energy and Climate Plans (NECPs) objectives

*Partial undergrounding:
technological alternative for grid development*

Rome, 29 October 2019

Cables in the National Transmission Grid

- *Existing projects*
- *Planned cables projects in the NDP horizon*
- *Planning criteria*
- *Underground cables VS Overhead lines: identification of best solution*
- *Operation experiences*

Cables in the National Transmission Grid

Existing projects

National Transmission Grid (existing circuits)

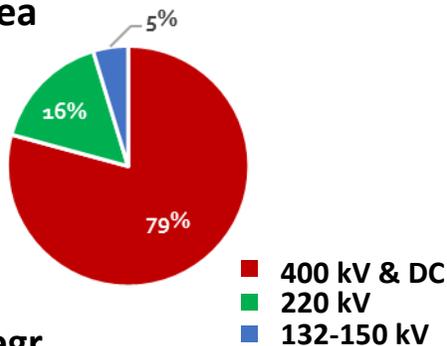
72.860 km



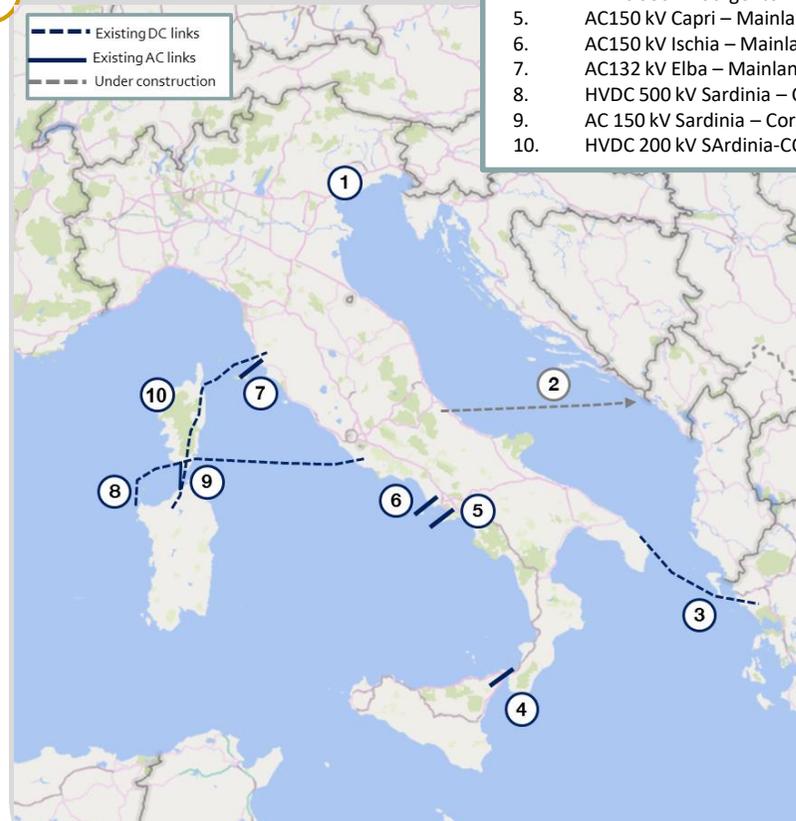
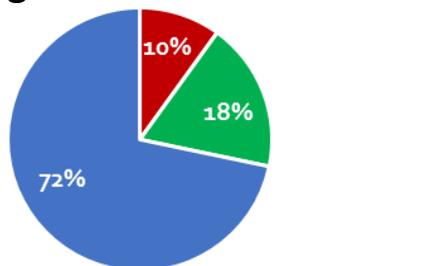
SubSea Cable (1.454 km) : 2 %

UnderGround Cable (1.920 km): 3 %

A Subsea



B Undegr.



1. AC 132 kV links in the Venice Lagoon
2. HVDC 500 kV IT – MNE (1st pole)
3. HVAC 380 kV Sorgente – Rizziconi
4. HVAC 380 kV Sorgente – Rizziconi
5. AC150 kV Capri – Mainland
6. AC150 kV Ischia – Mainland
7. AC132 kV Elba – Mainland
8. HVDC 500 kV Sardinia – Centre South
9. AC 150 kV Sardinia – Corsica
10. HVDC 200 kV SARDINIA-CORSICA-IT.

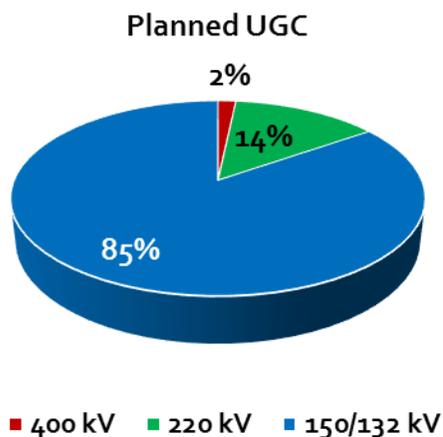
Subsea Cables are used for HV transmission (including DC technology) while undergrounding is mainly used on sub-transmission grid (<400 kV).

Cables in the National Transmission Grid

Planned cables projects in the NDP horizon

AC cables

1400km of underground AC cables planned in next 10 years



Undergrounding cables trend on the 150-132 kV sub-transmission networks is confirmed for planned projects.



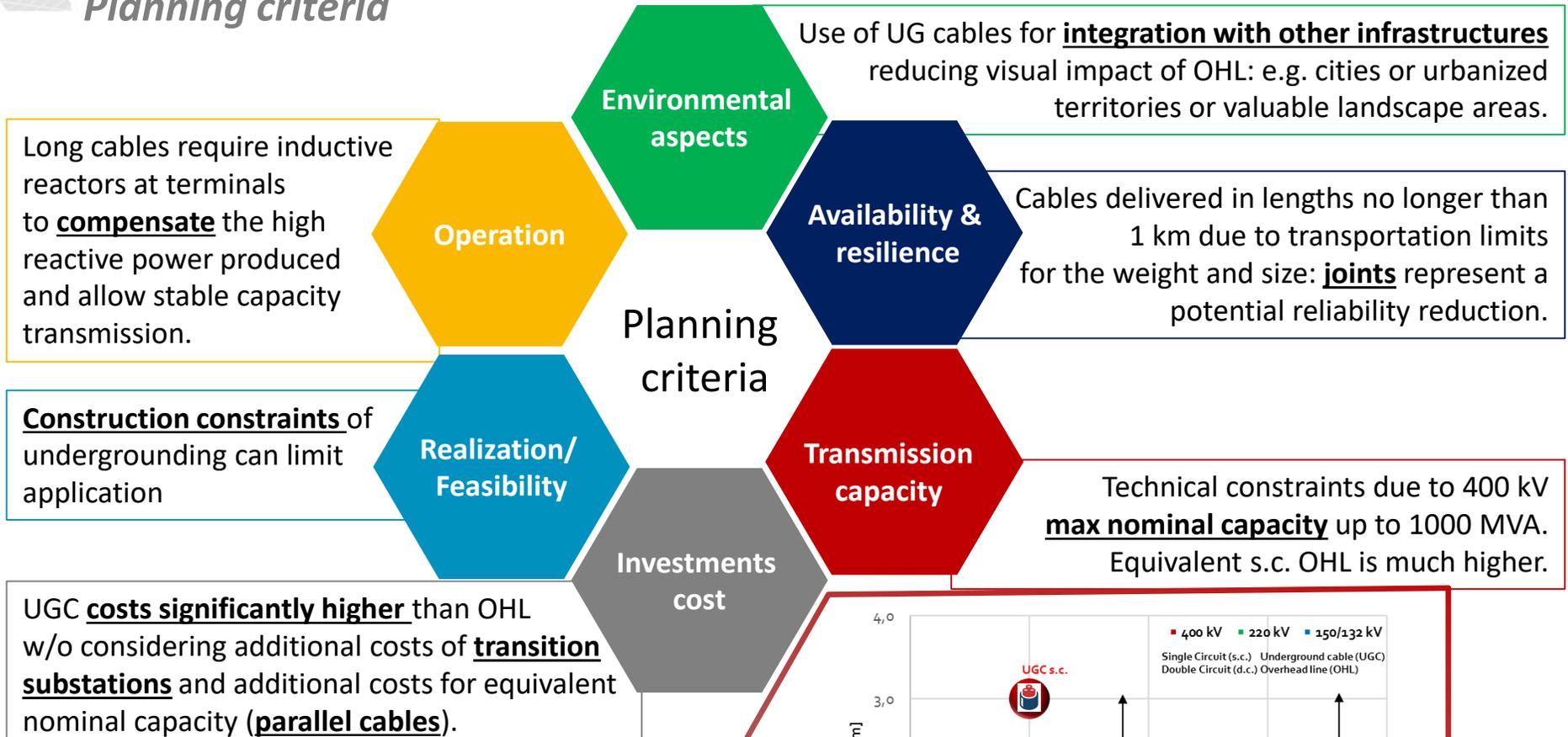
AC underground infrastructure total consistency (today+planned) will reach about **3.300 km**

DC cables

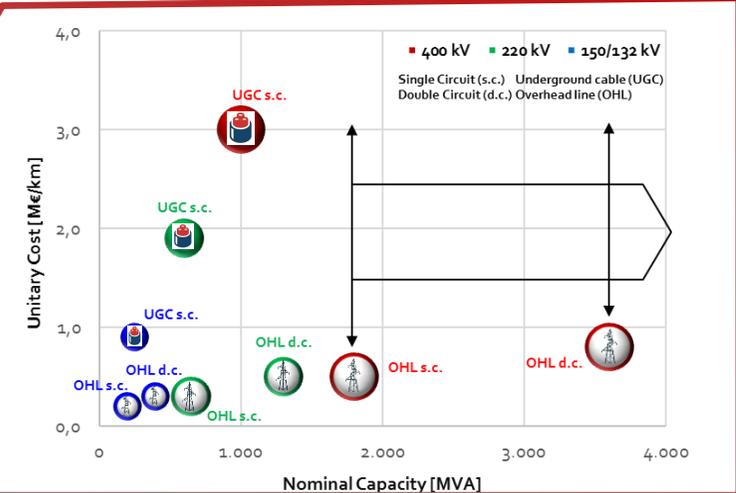


Cables in the National Transmission Grid

Planning criteria



Lower voltage level is one of the main factor in favour of undergrounding even due to the typical higher meshing network level and ensuring the **technology diversification** offering higher performances to different events.



Cables in the National Transmission Grid

UnderGround Cables VS OverHead Lines: qualitative evaluation

Technology and voltage level

	DC		400 kV		220 kV		150-132kV	
	OHL	UGC	OHL	UGC	OHL	UGC	OHL	UGC
Transmission capacity	↑	↑	↑	↓	↑	→	↑	↑
Availability & resilience	→	↑	↑	↓	↑	→	↑	↑
Investments cost	↑	→	↑	↓	↑	→	↑	↑
Realization/ Feasibility	↑	→	↑	→	↑	↑	↑	↑
Operation	→	→	↑	↓	↑	→	↑	↑
Environmental/ Visual Amenity	→	→	↓	→	↓	↑	→	↑

PLANNING CRITERIA

Cables in the National Transmission Grid

Operation experiences

Time to repair for cables are much higher (several weeks/months out of service) due to civil works or special works requested.



**Black out on the cable Elba island – Mainland
(about 40 minutes) caused by a bulldozer**



Fault of joint of Sorgente – Rizziconi link



Fault of Sa.Pe. I. due to trawling fishing

