Different European Policy and Stakeholder Approaches on Undergrounding Transmission Lines

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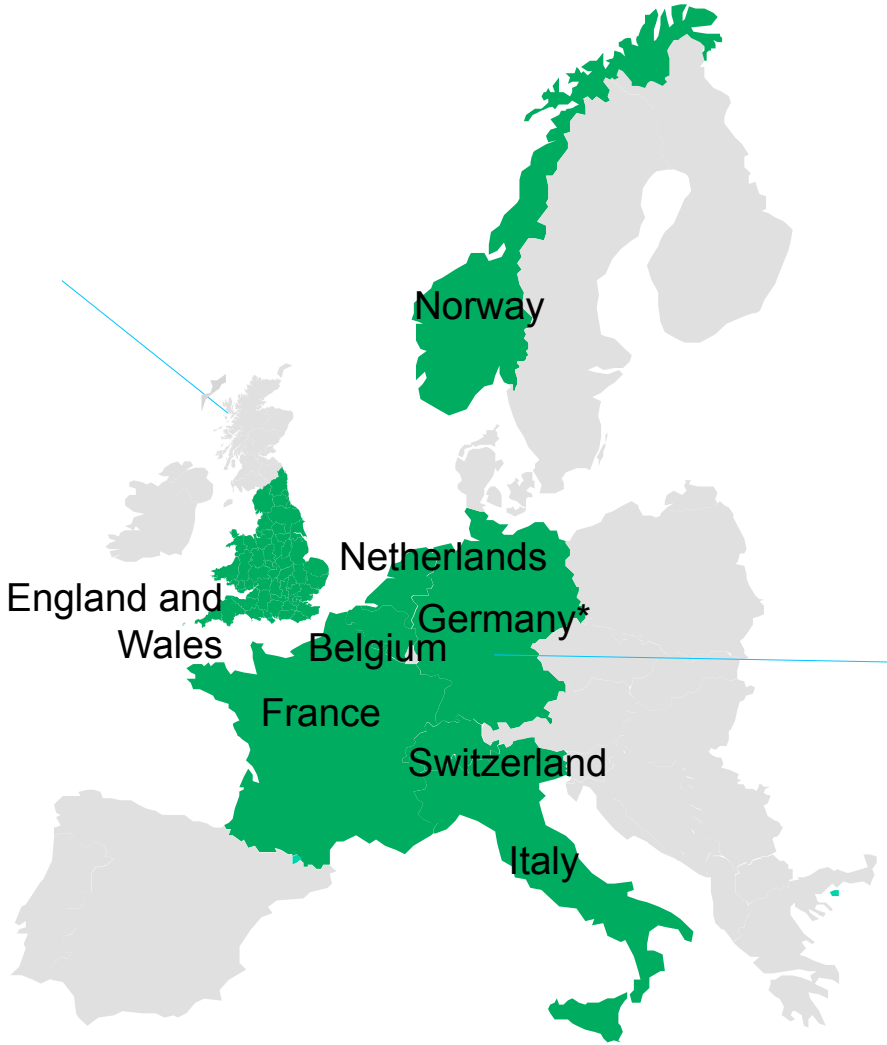
Interviewed RGI partner countries



Interviewed partner countries

*only TenneT and 50Hertz region

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How many 380kV cables are there actually?

	Existing				Planned			
	kV	# of projects	km	AC/DC	kV	# of projects	km	AC/DC
France								
Engl./Wales	400	some	195	AC	400	3	tbd	AC
Italy								
	380	some	Σ 25	AC	380		60 (***)	AC
Germany*	380	1	12;16	AC	380	4	up to 10	AC
Belgium	380	1	1	AC	380	1	10	AC
					380	1	50	DC
Netherlands	380	1	10;2; 3,5; 1	AC				
Switzerland					380	1	1	AC
	380	2	5;0,4	AC				
Norway								

* only TenneT and 50Hertz grid
** excl. Connections of generation/transformers
*** length calculated for km of linear route circuit

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220kV cables fairly common – however not in all countries

	Existing				Planned			
	kV	# of projects	km	AC/DC	kV	# of projects	km	AC/DC
France	225	many	Σ 1.253	AC	225	~20	up to 100	AC
					320	2	65; 95	DC
Engl./Wales	275	some	Σ 500					
	400	many	Σ 195	AC	400	3	tbd	AC
Italy	220	many	Σ 240	AC	220		160	AC
	380	some	Σ 25	AC	380		60 (***)	AC
Germany*	220	1	1,8	AC				
	380	1	12;16	AC	380	4	up to 10	AC
Belgium	380	1	1	AC	380	1	10	AC
					380	1	50	DC
Netherlands	380	1	10;2; 3,5; 1	AC				
Switzerland	220	1	2,5	AC	380	1	1	AC
	380	2	5;0,4	AC				
Norway								

* only TenneT and 50Hertz grid
** excl. Connections of generation/transformers
*** length calculated for km of linear route circuit

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Legal frame partially actively supports undergrounding in specific circumstances...

	Mentioning of cables in legislation	Legal changes/ changes in planning/permitting procedures	Criteria	Cost approach of regulatory agency
France	Obligation to underground under certain criteria Additionally public service contract	Undergrounding close to highways now easier Up to 15km: 225kV - No mandatory public enquiry >225kV: case by case decision on public enquiry	Mandatory undergrounding in classified heritage site; national natural park; nature reserve; 100m corridor along the coast Public service contract: promote 225kV undergrounding for - new lines: 50.000+ residential areas - existing corridors: significant increase of environmental impacts	Authorities sign-off extra costs of undergrounding if RTE proposes this as best solution, as far as the total global investment amount remains unchanged
Engl./ Wales	No - but covered in government policy guidance	Change in government policy guidance - clear request to consider all technological options, including undergrounding	old: consideration of undergrounding in national parks/rivers/urban areas new: criteria based approach replaced by public consultation of each individual case	Governmental policy requires weighing of multitude of aspects, costs is only one of them
Italy	Only in environmental legislation (related to EIA application)	EIA applied to potential cable solution when length more than 40 km	Terna internal criteria: distance to residential areas, EMF, strength of electrical system, seismic level	Focus: efficiency and security being equal, to choose the lowest investment costs

…considers it as a future option or rejects it completely

	Mentioning of cables in legislation	Legal changes/ changes in planning/ permitting procedures	Criteria	Cost approach of regulatory agency
Germany	4 projects nominated as potential pilotes - authority request needed	Discussion to legally request an HVDC onshore pilot EIA requires additional cabling studies	Proximity (200/400m) to residential areas	Focus: low investment costs
Belgium	Cabling generally an option	Development of criteria when to consider cables (investigation allowed also without critieria)	Natura 2000 landscape; protected landscapes/momuments, densely habitated area	Regulator will accept undergrounding if spatial plan requests it
Nether-lands	No mentioning of cables	No	No specific criteria that request undergrounding or study of it	Regulator will accept undergrounding if spatial plan requests it
Switzer-land	No mentioning of cables	Basic evaluation scheme - study on cables is part of the sectorial planning procedure	Criteria mentioned in the basic evaluation scheme: environmental protection, technology, cost effectiveness and spatial development	According to the evaluation scheme
Norway	Clarifications why cables are NOT to be considered	No - cable approch recently confirmed	Keep distance of 100m to residential areas	Focus: low investment costs

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Expectations of additional legal clarity on undergrounding differ substantially

The legal situation is clear, now we need to built pilots fast to gather experiences on what is technically possible, then we might have to adjust the legislation (TenneT)

More criteria don't help: it is very difficult to come up with criteria that work in all circumstances – clarity can only be given by a clear process and clear decision points for or against undergrounding (National Grid)

We can't ignore the technological challenges – gathering experiences via the pilots is the right approach (50Hertz)

Additional legal rules is not necessarily a solution because they always give more room for (mis-)interpretation (Terna)

More legal clarity would be helpful – today we are forced into discussions on undergrounding also where it does not make sense (RTE)

Legal clarity when undergrounding would be helpful – otherwise, there is a risk we have to do it in every 380kV-project even though there are also clear disadvantages to undergrounding (Elia)

A multidimensional and established evaluation scheme would help to determine when to use undergrounding solutions (Swissgrid)

Directly affected stakeholders with differentiated view on cables

	Pro cable because of	Contra cable because of
Population	▪ Visual impact ▪ Value of real estate ▪ **EMF**	▪ **EMF** ▪ Energy bill
Farmers	▪ Visual impact ▪ **Loss of land**	▪ Impact on crops ▪ Soil quality/drainage ▪ Pylons "better understood" ▪ **Loss of land**
Foresters	▪ **Need to cut less trees with cable** ▪ Corridor as woodfire protection ▪ Storm damage on OHL in wooden areas can be difficult to repair	▪ Heavy machinery to build ▪ **Need to cut less trees with OHL** ▪ Higher ecological value of OHL
Environmen-tal Groups	▪ Impact for birds ▪ Visual impact = environmental impact	▪ Danger for sensitive soils
Municipali-ties	▪ Visual impact ▪ Landscape value ▪ Real estate value	▪ Higher complexity to build cable ▪ Loss of pylon tax (France)

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