

Continental Central South Regional Group Investment Plan

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Continental Central South Regional Plan

- Main drivers
- Scenarios
- Market studies and results
- Network studies and results

Projects of Regional Relevance

Main Messages

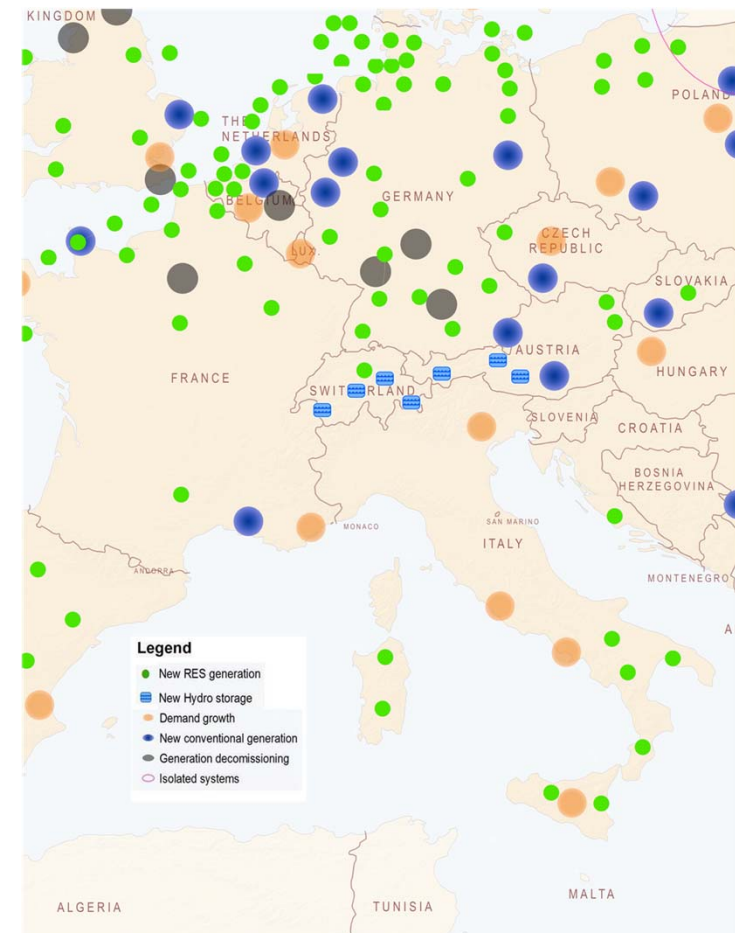
Main drivers in CCS (1/2)

Massive RES connection

- Integration of significant growth of WFs and PVs with an increasing flows from North-South
- More flexible conventional generations is needed (efficient of balancing)
- Offshore interconnections and optimized usage of available hydroelectric facilities will also trigger new investment requirements

Integration of storages plants, mainly hydro in the Alps region, facilitating an efficient use of RES

- High and fluctuating utilization of the transmission networks due increasing penetration of variable renewable generation
- Transmission network architecture needs to be adapted and expanded to allow transmission over long distances



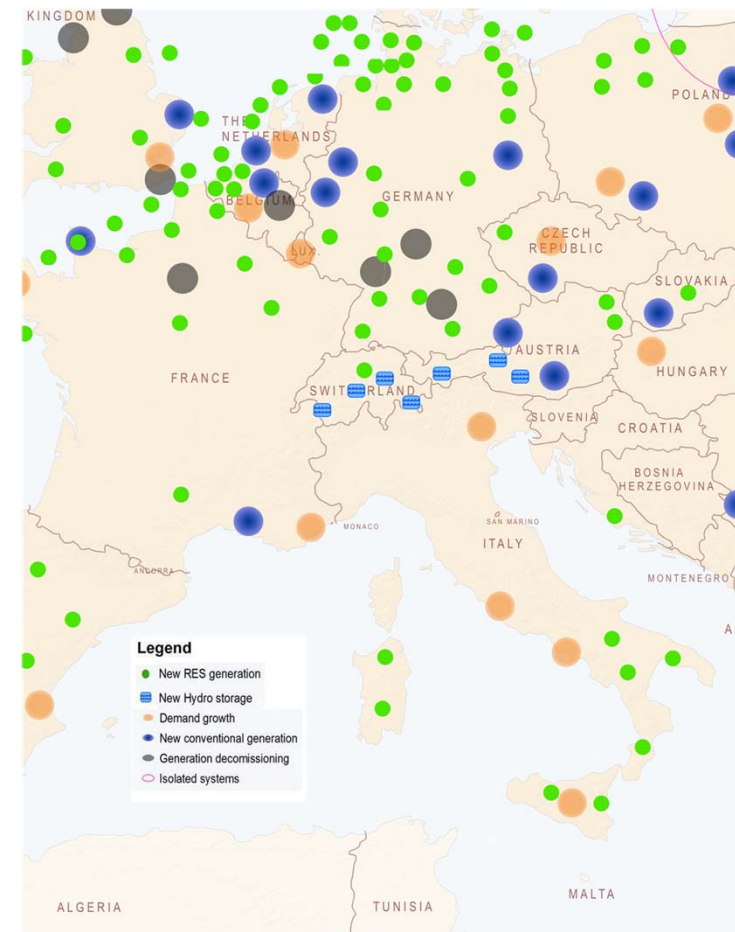
Main drivers in CCS (2/2)

Nuclear phase out in Germany

- Affections on electricity flows along the whole CCS Region
- Generation and load balance in Germany will become more stressed
- Germany could depend on imports (mainly from Eastern Europe) especially in case of high demand conditions and low RES generation

Power supply of some European cities and regions

- Increasing of cross – border capacity
- Reinforcements will be needed and could become an issue for some cities and regions in Europe (France, Italy, Germany)



Market study of CCS Region

➤ Two Market tools adopted:

- **Promed** (IT)
- **Antares** (FR)

➤ 18 countries simulated

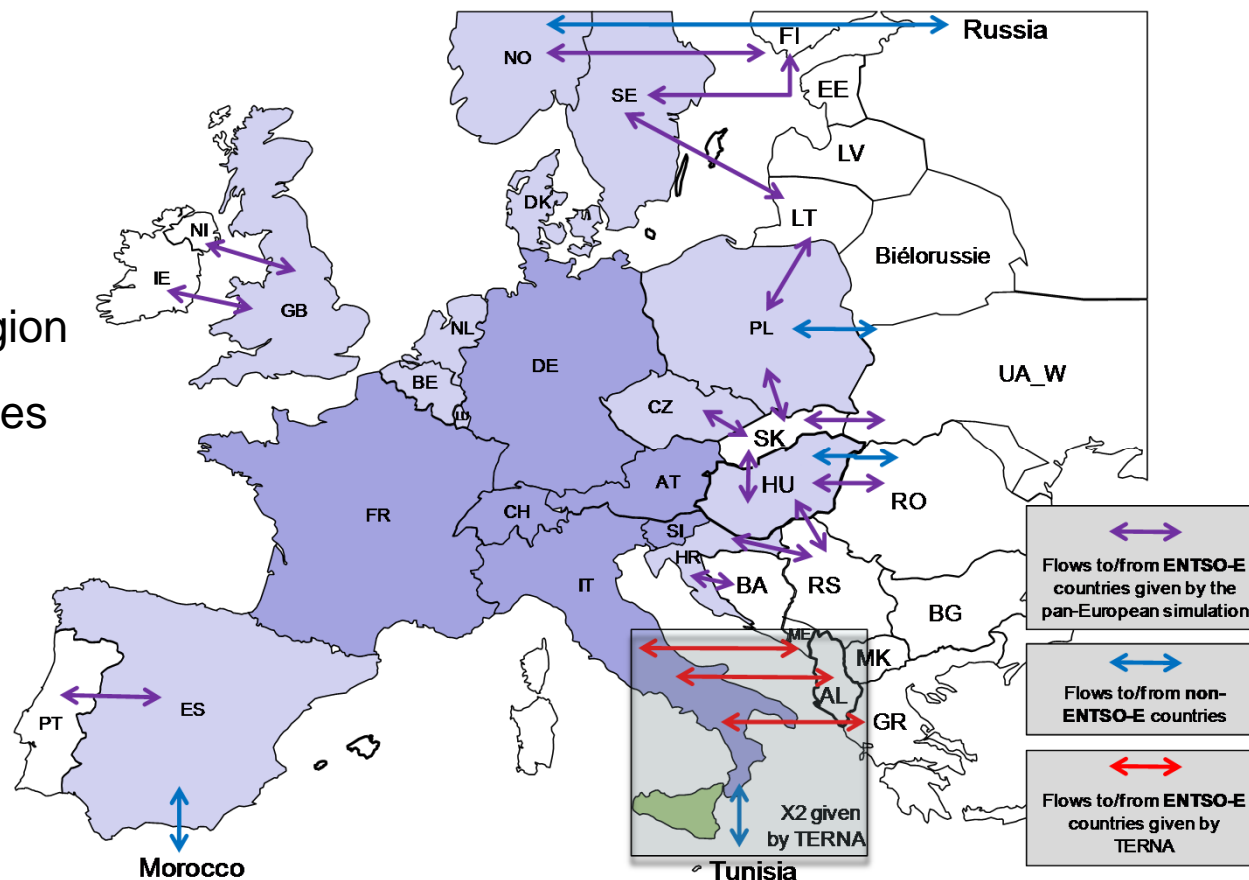
- **6 countries** in CCS Region
- **12 «1st neighbour»** countries

➤ CCS Region: detailed information

➤ Extended perimeter: **PEMD**

➤ Exchanges with rest of EU:

CCE_RG simulation



Overview of Scenarios



YEAR 2020

ENTSO-E Based Scenario (as in SO&AF)

- EU 2020: built to meet 20-20-20 EU targets, according to NREAPs

Top-down



ENTSO-E Based Scenario (as in SO&AF)

- **BEST ESTIMATE (B):** by the TSOs

Bottom-up



Sensitivity analysis

- **NUCLEAR PHASE-OUT (NPO):** assuming that most of nuclear generation units in Germany will be shut down

Assumptions

- LOAD
- THERMAL GENERATION
- HYDRO GENERATION
- WIND AND SOLAR
- OTHER MUST RUN UNITS

- MERIT ORDER

Market Studies: Valuation of Reinforcements

Assessment of reinforcements benefits:

Simulations with/without reinforcement ⇔ Measure benefits of planned cross-border reinforcements

Main results coming from Market studies:

- Variation of the generation per technology [TWh]
- Social Economic Welfare (variation of the variable generation costs) [M€]
- Variation of CO2 emissions [Mtons]
- RES integration (how much energy spillage avoided) [GWh]
- Energy exchanged [TWh] & congestions on the interconnections [%]

EU2020/ScB/NuclearPhaseOut: generation and balance

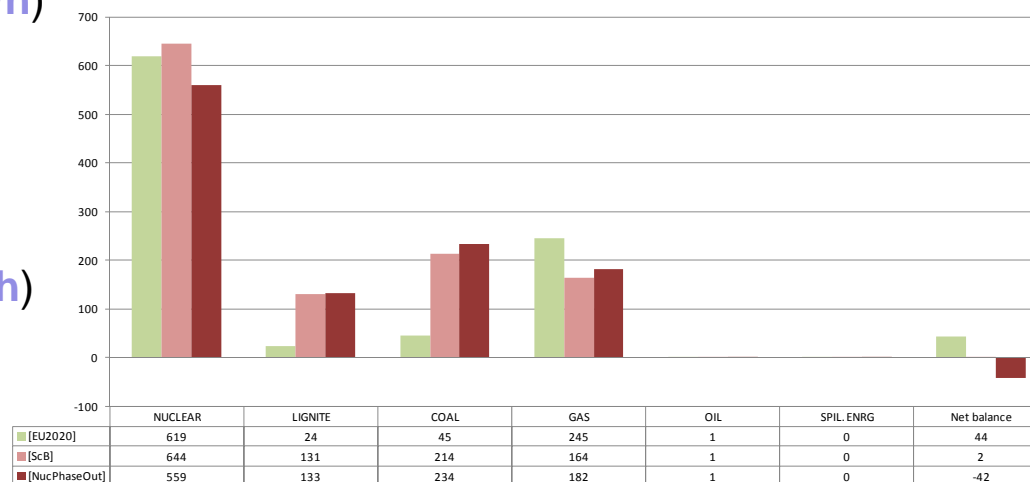
EU 2020:

- ✓ Net export from CCS area (+ 44 TWh)
- ✓ Strong contribution from:
 - ✓ Nuclear Source
 - ✓ Gas source

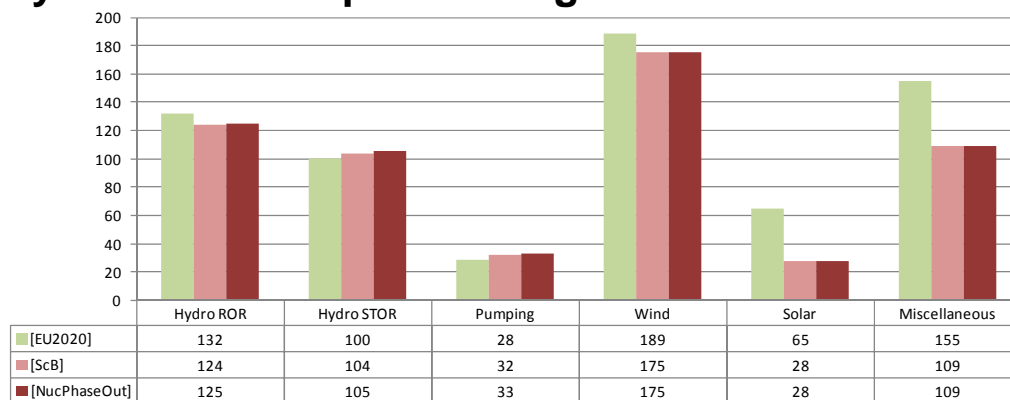
Nuclear Phase Out:

- ✓ Net import from CCS area (- 42 TWh)
- ✓ Strong contribution from:
 - ✓ Coal source
 - ✓ Gas source

Dispatchable generation and Net Balance



Hydro & Non-Dispatchable generation



All scenarios:

- ✓ Strong contribution from:
 - ✓ Wind source (189-175 TWh)
 - ✓ Hydro (228-232 TWh)

EU2020/ScB/NuclearPhaseOut: main results

Impact on the generation breakdown:

In all scenarios, decrease of gas generation in Italy that is replaced by:

- ✓ EU2020: French nuclear and German gas
- ✓ ScB and NuclearPhaseOut: German coal + coal from the 1st neighbours (PL, NL, GB)

CO₂:

- ✓ EU2020: decrease of 9 Mtons (gas ⇔ nuclear + gas)
- ✓ ScB (resp. NuclearPhaseOut): increase of 9 (resp.12) Mtons (gas ⇔ coal)

Generation cost savings:

For all modelled countries: **-540 M€** (NuclearPhaseOut) to **-730 M€** (scenario B)

Spillage:

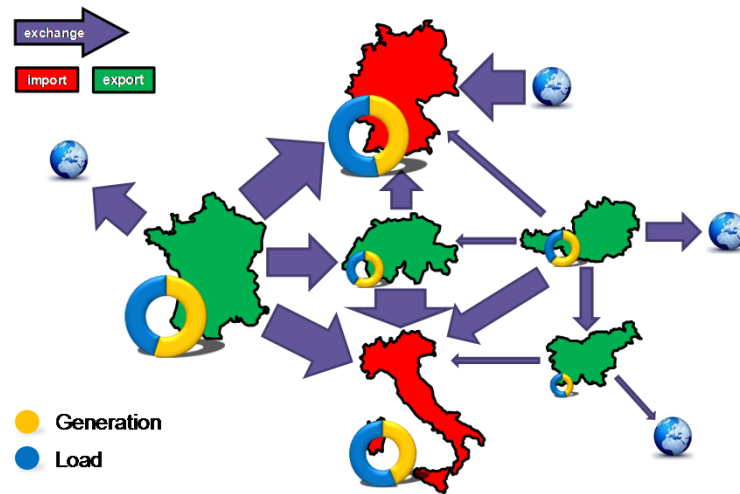
- ✓ EU2020: spillage in Germany - LT reinforcements are sufficient to reduce significantly spillage
- ✓ ScB and NuclearPhaseOut: no spillage

Network study of CCS Region: cases

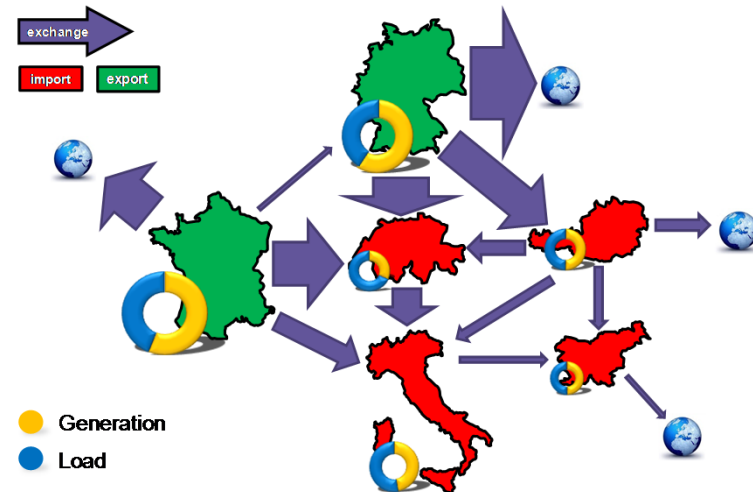
Typical snapshots considered in order to maximise the flows and cross-border exchanges

- *Winter low load, high RES generation*
- *Winter high load, low RES generation*

Load-flow simulations have been conducted for each of these configurations



Low RES case: All Clusters in service



High RES case: All Clusters in service

ENTSO-E TYNDP 2012 package

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Projects of Regional Relevance

Main Messages

Focus on CCS Region

- ✓ **34** projects
- ✓ **21,800 km** total length in CCS Region
 - ~ 8,700 km on Mid Term
 - ~ 13,100 km on Long Term
- ✓ **About €52 billions** of investments considering projects of pan-European significance
 - Mid Term investments: ~ 19,300 Mil€
 - Long Term investments: ~ 33,500 Mil€
- ✓ **100 MtCO₂/y** savings -> 2nd highest contribution in ENTSO –E perimeter with BS and CCE
- ✓ **About 615 Mln€** of cost savings in EU2020

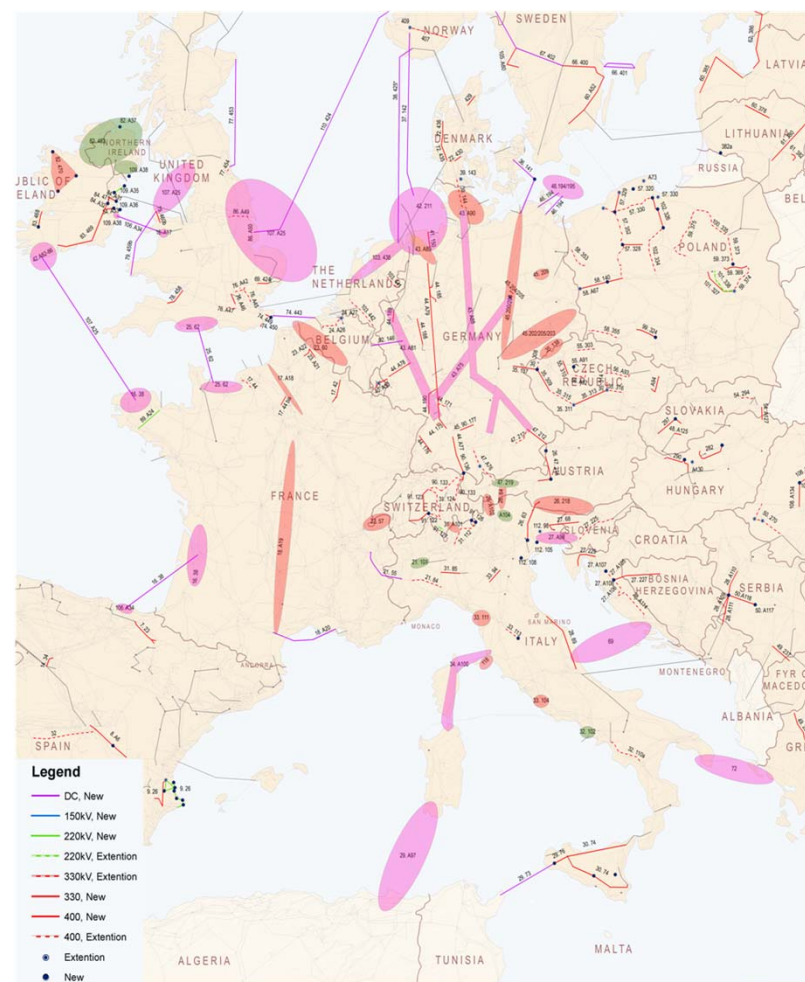


Projects of Regional relevance

Mid Term Investments



Long Term Investments

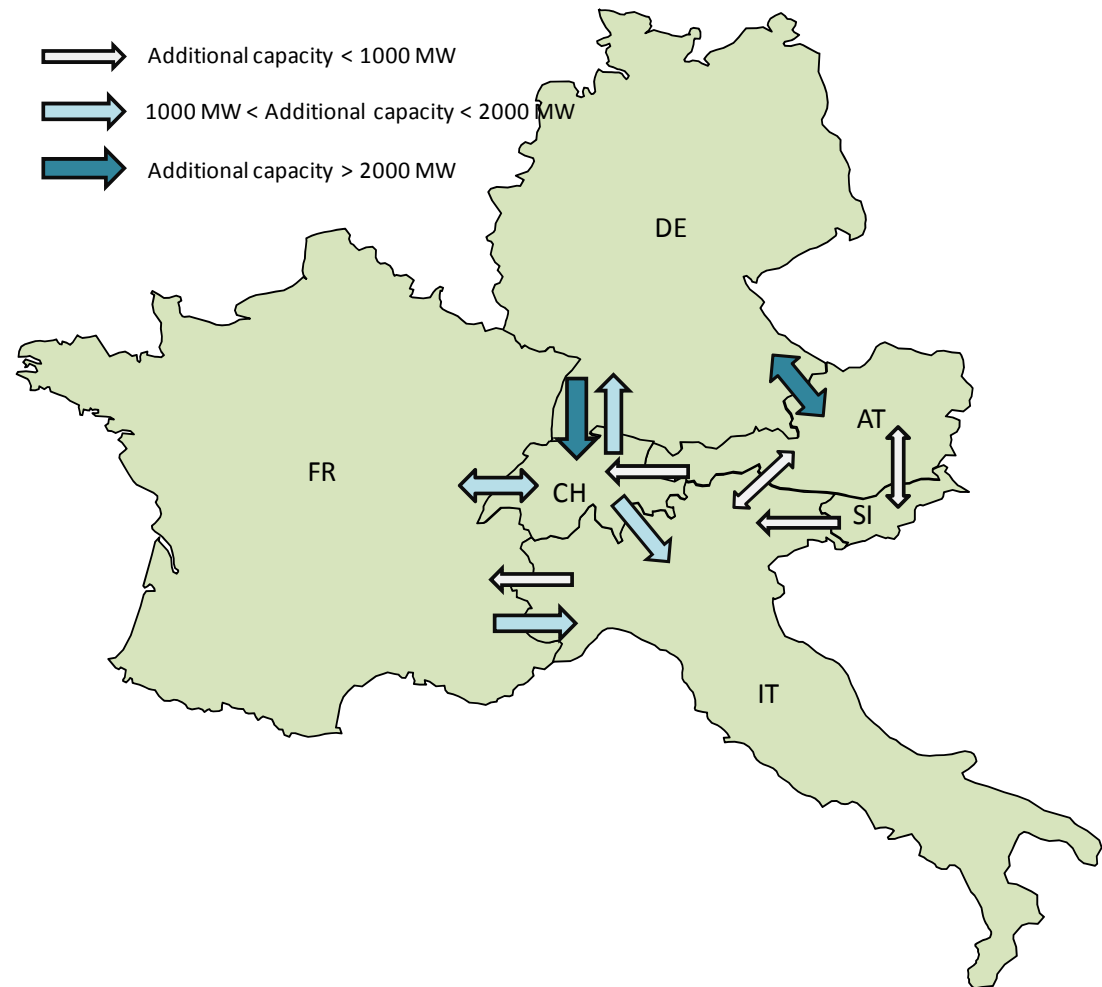


Focus on interconnections in CCS Region

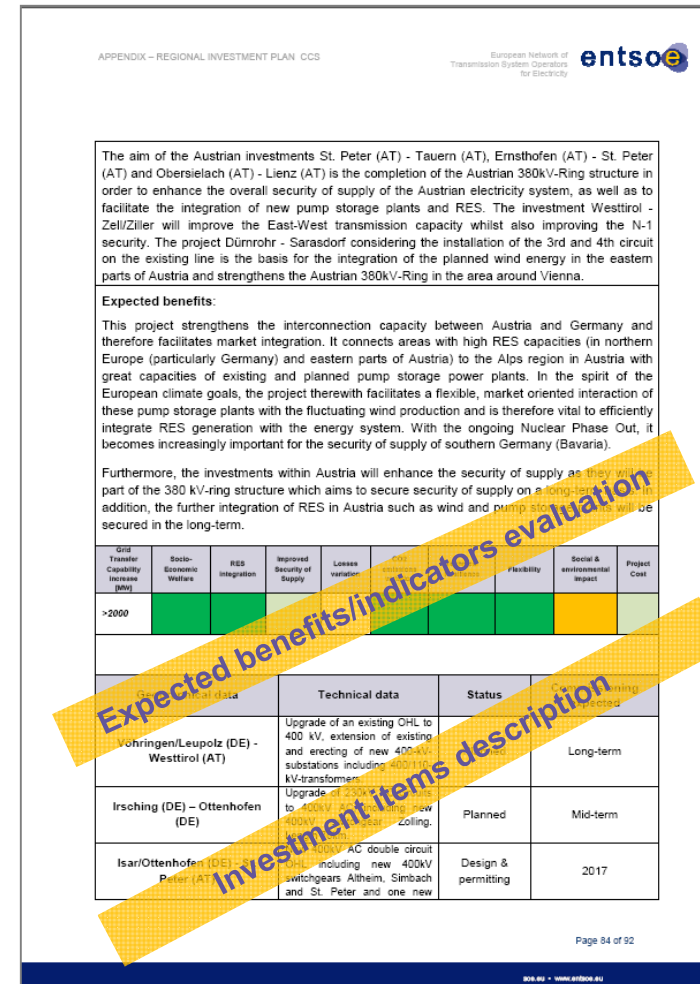
✓ **9** interconnections in CCS perimeter

✓ **615 Mln€** of Generation cost savings in EU2020

✓ **9 Mton/y** of CO₂ emissions in EU2020



Interconnection projects in CCS Region - Appendix 1



ENTSO-E TYNDP 2012 package

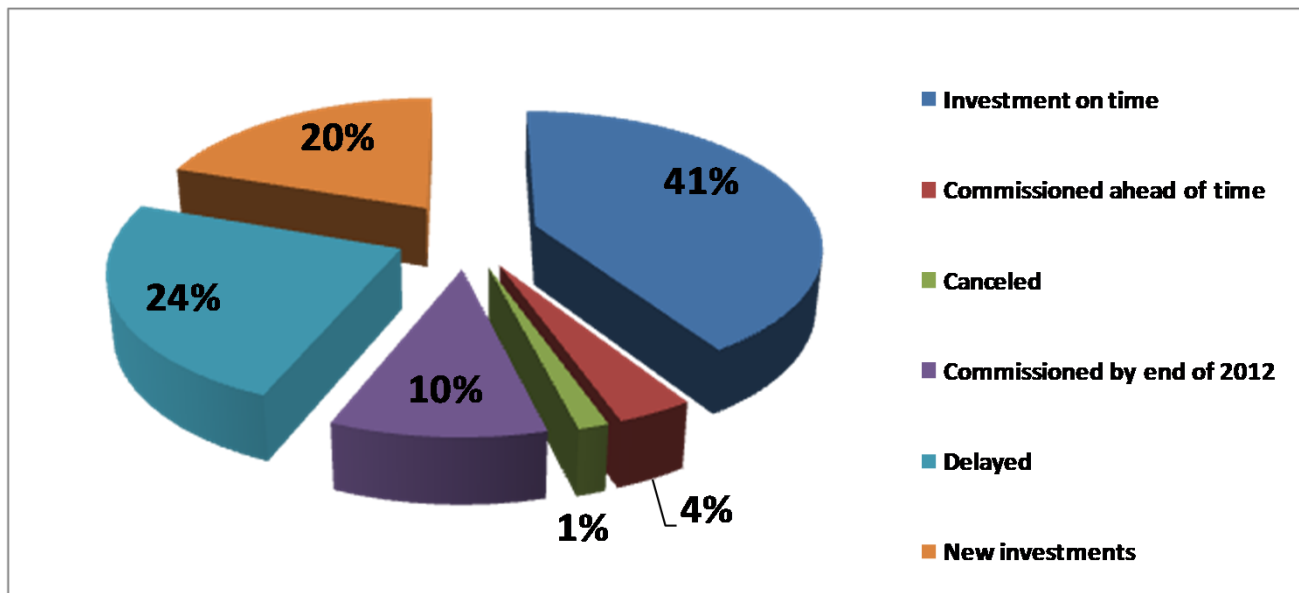
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Differences with TYNDP Pilot release



MONITORING: status TYNDP 2012 VS TYNDP 2010

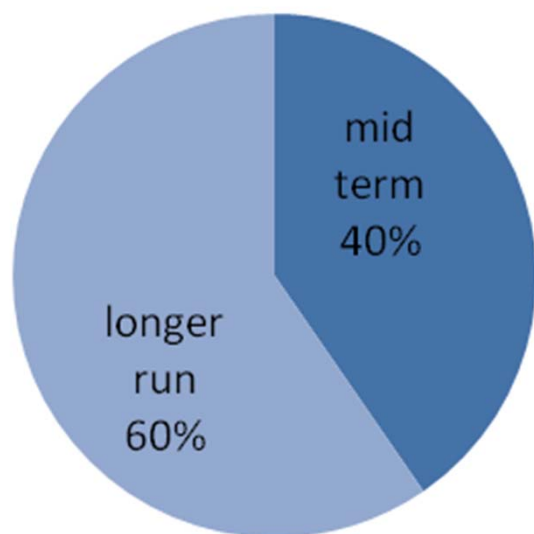
20% investments delayed compared with TYNDP 2010

41% investments commissioned on time

20% new investments

Expected benefits of CCS projects (1/3)

CCS Projects



The projects

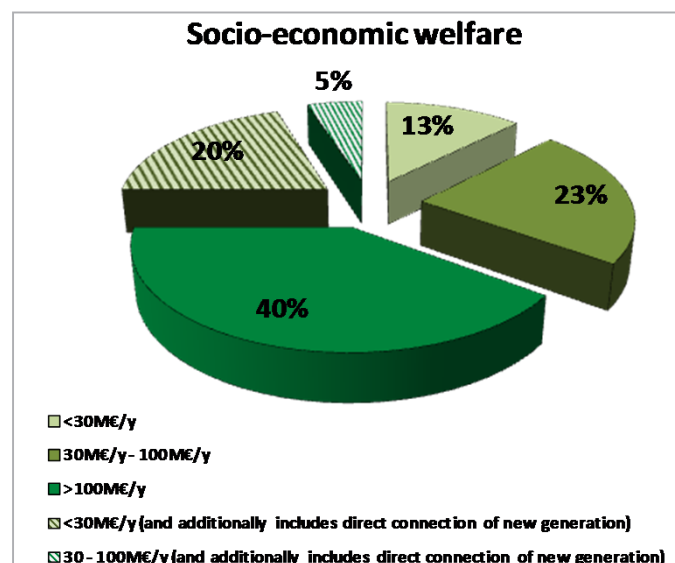
Medium Term: **40%** - Long Term: **60%**

Investments: **62%** AC technology - **38%** DC technology

AC investments: **69 %** are new infrastructures - **31%** are new lines upgrading/uprating;

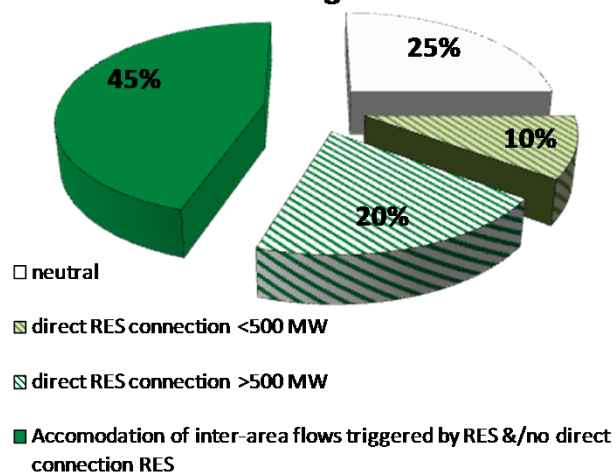
DC: **95%** are new infrastructures

Social & economic welfare Indicator
40% of planned projects are expected to reserve >100M€/y when commissioned



Expected benefits of CCS projects (2/3)

RES integration



RES integration

20% projects of CCS RG contribute to direct RES connection

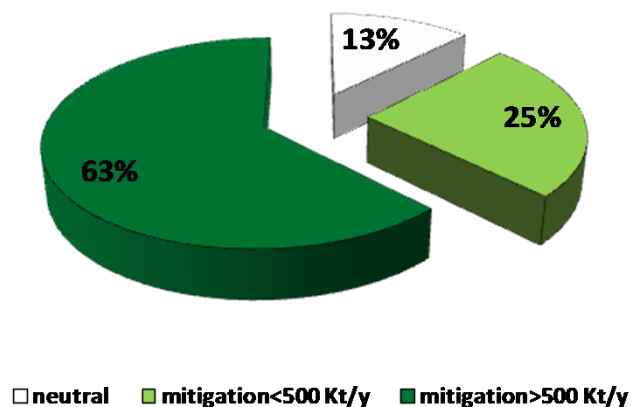
45% projects of CCS RG accommodate inter-area flows triggered by RES

Security of Supply

Eliminate risk of SoS in next 10 years: **33%**

Improving SoS in next 10 years: **58%**

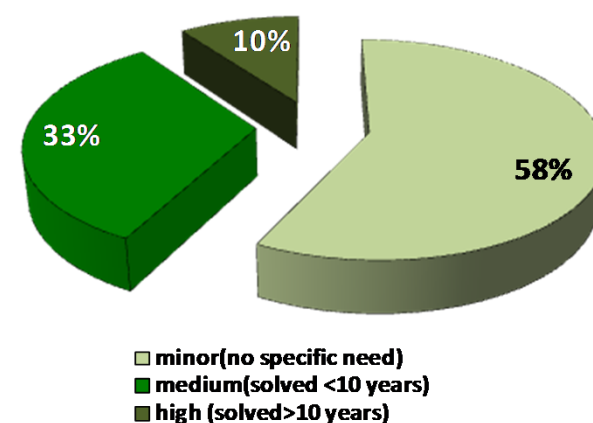
CO mitigation



CO mitigation

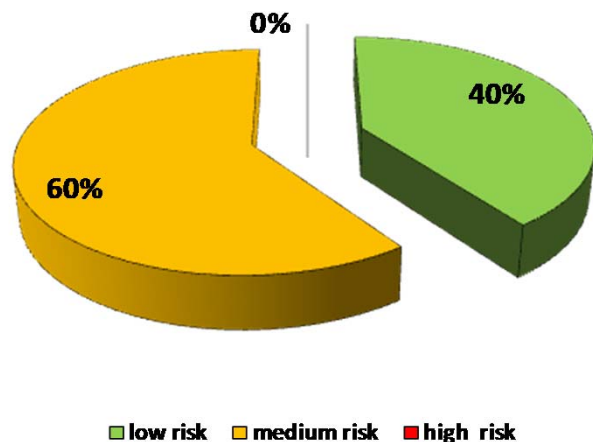
63% CCS projects take part in CO mitigations

Security of Supply



Expected benefits of CCS projects (3/3)

Social and environmental impact



Social&environmental Impact

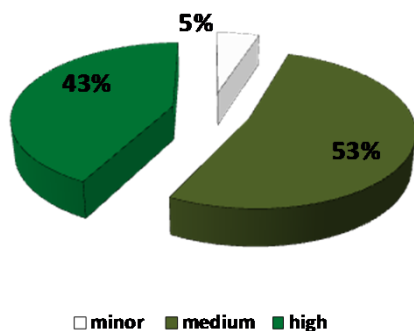
40% are interested by medium risk of social and environmental problems

60% projects of CCS RG are interested by medium risk of social and environmental problems

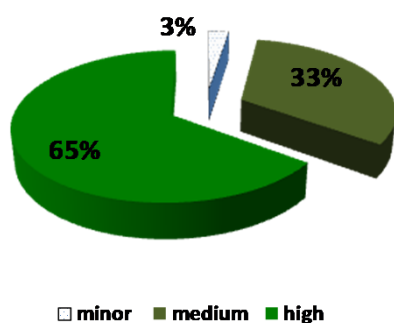
Losses variation

28% projects of CCS RG contribute to reduce losses

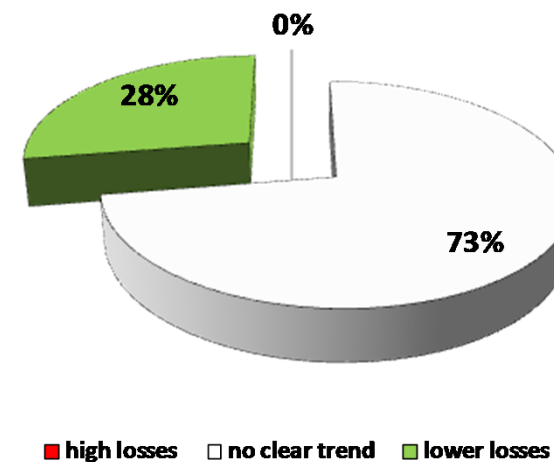
Technical resilience



Flexibility



Losses variation



THANK YOU FOR YOUR ATTENTION !