Project assessment – provisional results

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entsoe
Reliable Sustainable Connected

TYNDP 2014 - Continental Central South (CCS) Region

In the CCS Region, there are more than 30 TYNDP projects

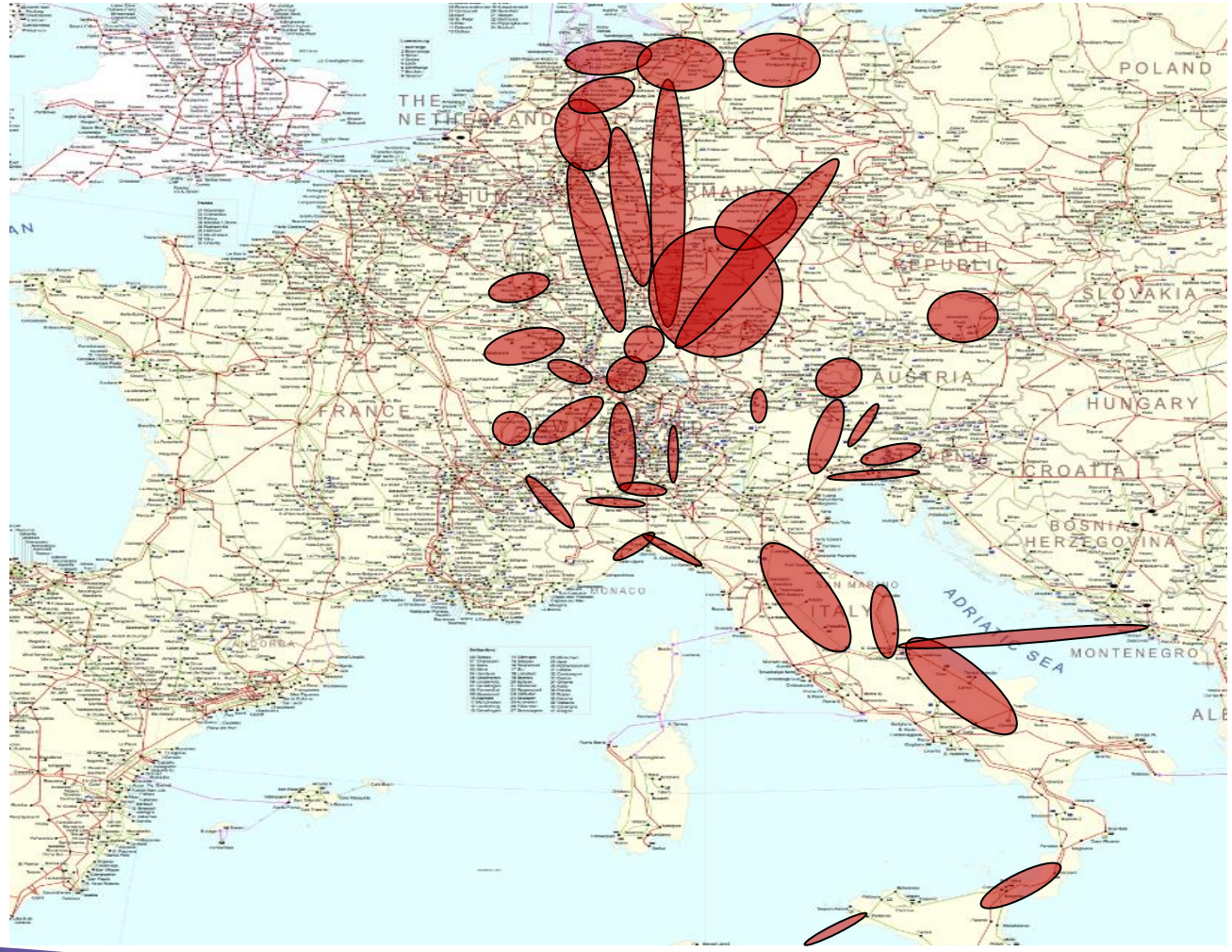
- 9 projects interconnecting CCS Region with neighbouring pan-EU systems
- 10 cross-border projects (2 TPPs) interconnecting CCS Countries
- 9 internal transmission projects
- 4 TP storage projects (HPP)

all these projects are assessed in the TYNDP

TYNDP 2014 - Continental Central South (CCS) Region

Preliminary overview

Transmission projects assessed by RG CCS



TYNDP 2014 - Continental Central South (CCS) Region

A *project* is a set of *investments* clustered according to the following rules:

- each investment's GTC should equal at least 20% of the project's GTC
- the last investment of a project should not be commissioned more than five years after the first investment

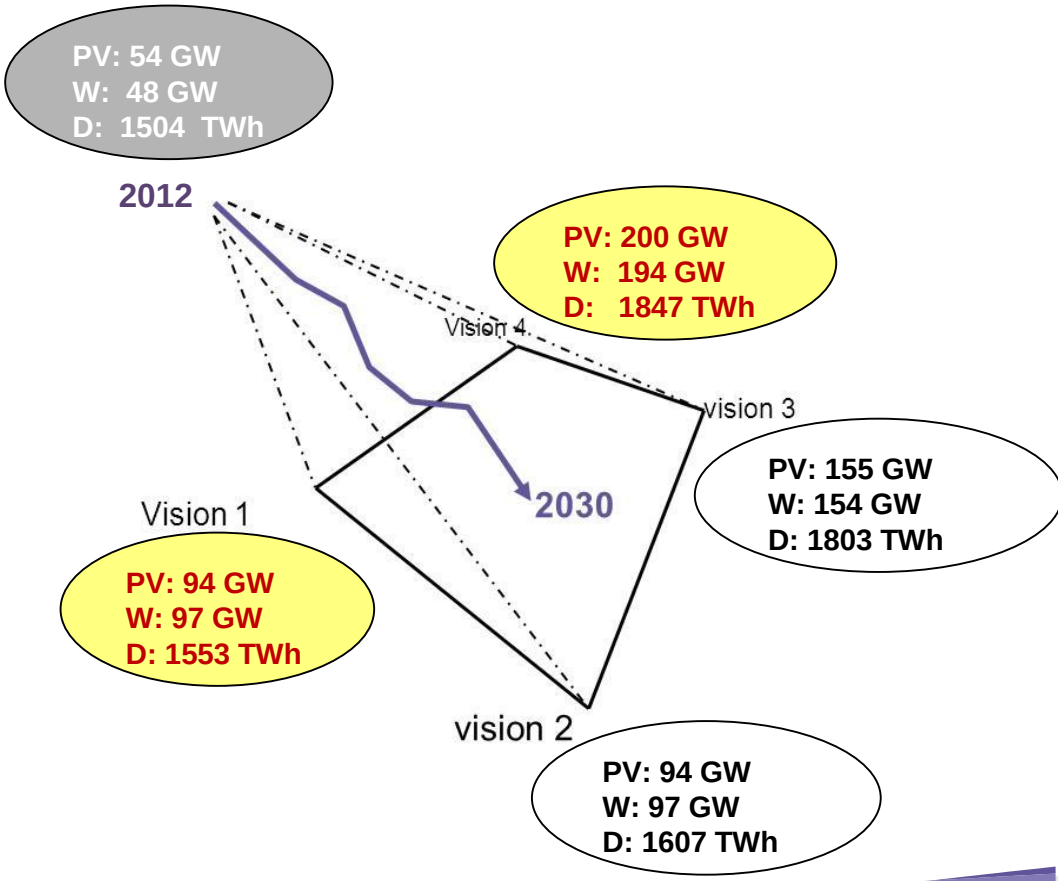
Each project is assessed with the technical and socio-economic indicators according to the CBA methodology.

TYNDP 2014 - Continental Central South (CCS) Region

Up to now, the projects have been assessed in Vision 1 and Vision 4.

Variable RES power capacity [GW]
Electricity Demand [TWh/y]

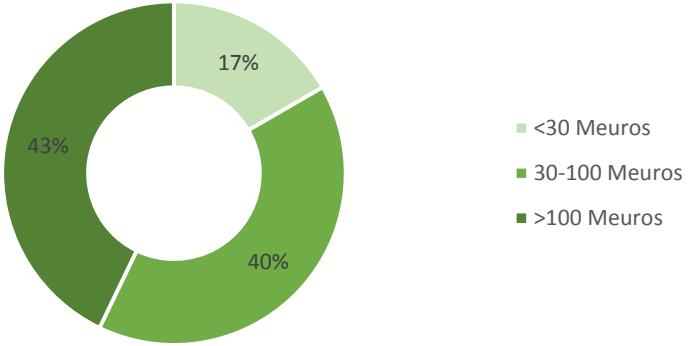
Values for CCS Region



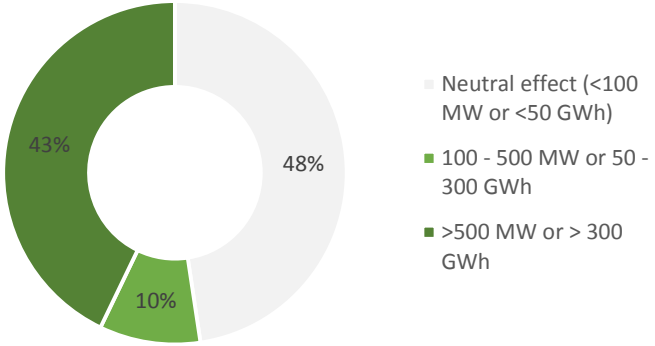
Overview of the CBA Results on Vision 1

Provisional results

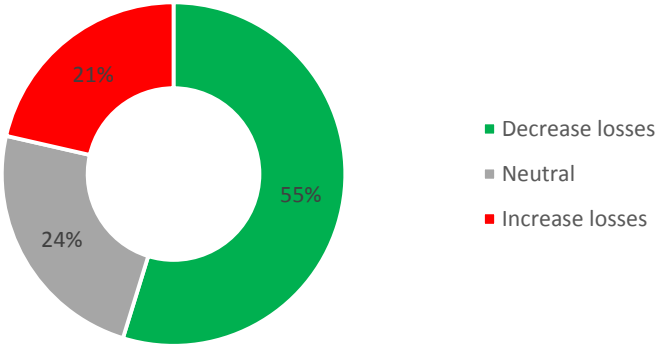
SEW increase



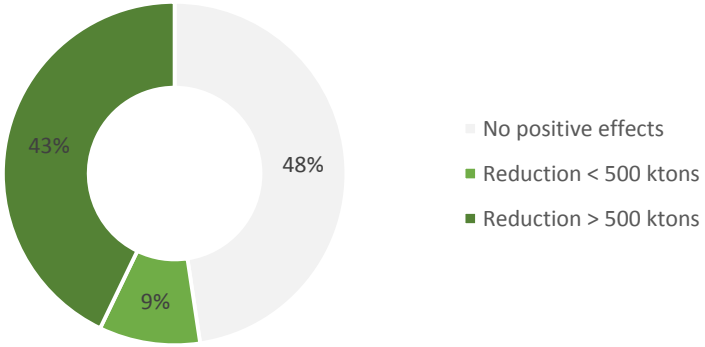
RES integration



Losses variation



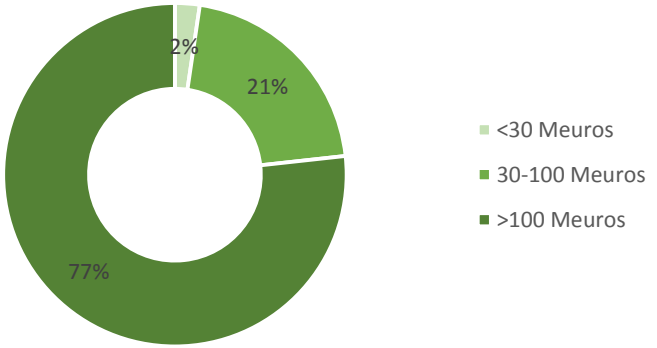
CO2 emissions reduction



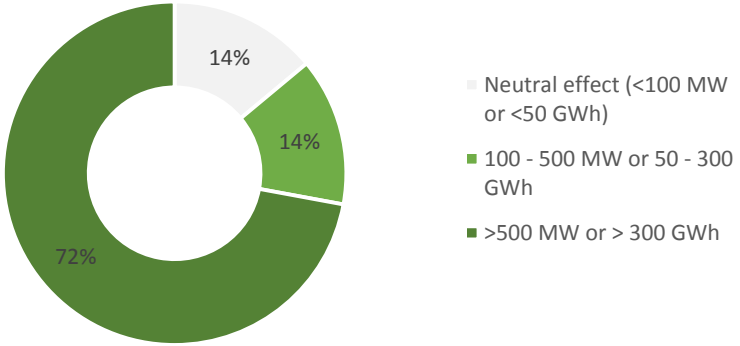
Overview of the CBA Results on Vision 4

Provisional results

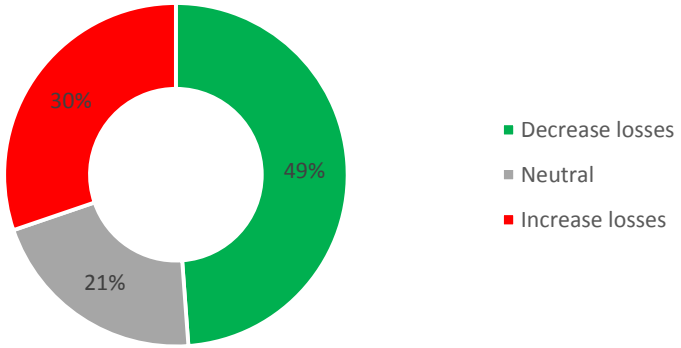
SEW increase



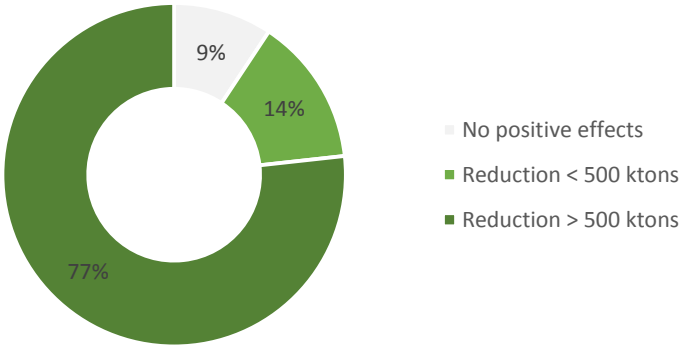
RES integration



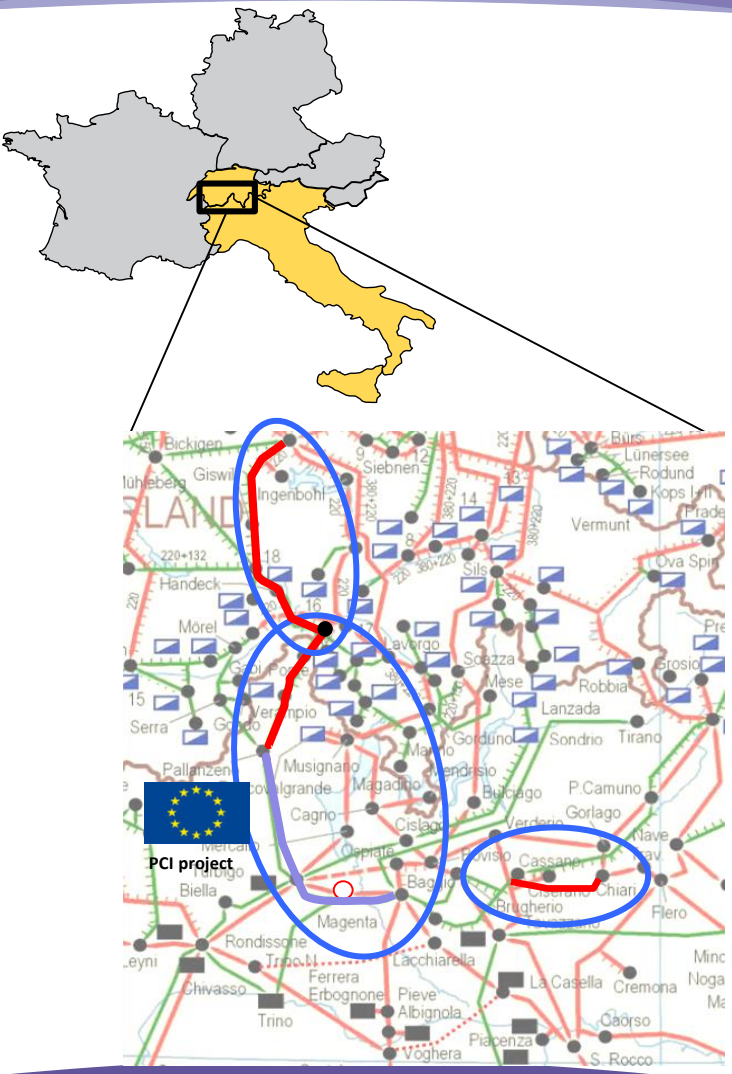
Losses variation



CO2 emissions reduction



Example: Project 31 - San Giacomo interconnector project



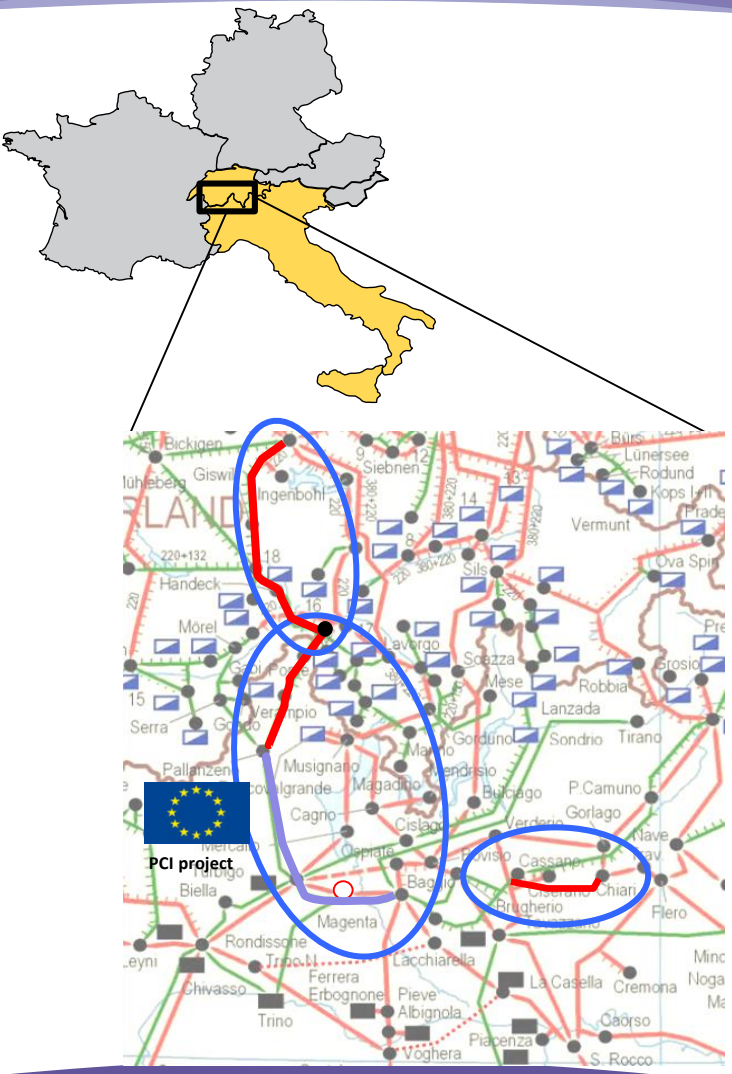
The project consists in a new 400 kV OHL San Giacomo – Pallanzeno line and the conversion from AC to DC of the 220 kV OHL Pallanzeno – Magenta – Baggio (including the realization of the 2 AC/DC converter stations in Pallanzeno and Baggio and the upgrade to 400 kV of the existing 220 kV substation Magenta).

Additional internal lines in Italy (new 400 kV OHL Cassano-Chiari) and in Switzerland (upgrade to 400 kV of the of existing 225 kV OHL Airolo – Mettlen) are required to get full advantage from the interconnection capacity provided by the cross-border line.

The project, by increasing the GTC between Switzerland and Italy, favours the market integration between the two countries as well as the use of the most efficient generation capacity.

Example: Project 31 - San Giacomo

Draft results V1

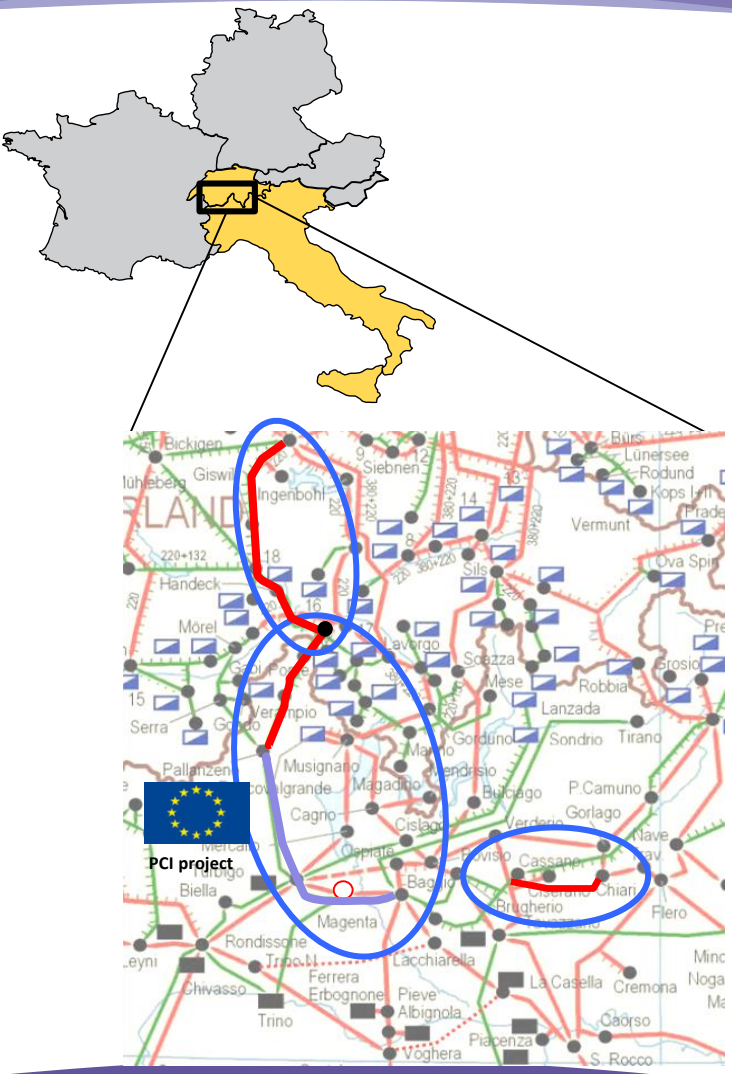


San Giacomo Project	
Short description	Reinforcement of the interconnection between Italy and Switzerland (including 2 PCIs)
Investments included in the project	✓ A new 400 kV interconnection San Giacomo - Pallanzeno of about 60 km (substituting existing 220 kV assets) ✓ Conversion from AC to DC of the 220 kV OHL Pallanzeno-Baggio *(100 km)* ✓ Upgrade of existing 225 kV OHL to 400 kV between Airolo and Mettlen *(90 km)* ✓ Upgrade of Magenta substation with a new 400 kV section ✓ New 400 kV line Cassano-Chiari *(35 km)*
GTC Increase	CH – IT: 1000 MW IT – CH: 600 MW
Investment cost	600 – 1100 M€
B1: Security-Of-Supply	< tool accuracy
B2: SEW	About 54 M€/year *
B3: RES Integration	< tool accuracy
B4: Power Losses variation	20 GWh/year increase (use of HVDC)
B5: CO2 emissions variation	510 ktons/year increase (coal replacing gas) *

* The numbers do not take into account the uncertainty on the results inherent to long term planning. Ranges may be defined later in the process to account on it.

Example: Project 31 - San Giacomo

Draft results V4



San Giacomo Project	
Short description	Reinforcement of the interconnection between Italy and Switzerland (including 2 PCIs)
Investments included in the project	✓ Two new 400 kV interconnections San Giacomo -Pallanzeno of about 60 km (substituting existing 220 kV assets) ✓ Conversion from AC to DC of the 220 kV OHL Pallanzeno-Baggio *(100 km)* ✓ Upgrade of existing 225 kV OHL to 400 kV between Airolo and Mettlen *(90 km)* ✓ Upgrade of Magenta substation with a new 400 kV section ✓ New 400 kV line Cassano Chiari *(35 km)*
GTC Increase	CH – IT: 1000 MW IT – CH: 950 MW
Investment cost	600 – 1100 M€
B1: Security-Of-Supply	< tool accuracy
B2: SEW	About 60 M€/year *
B3: RES Integration	4 GWh/year
B4: Power Losses variation	55 GWh/year increase (use of HVDC)
B5: CO2 emissions variation	130 ktons/year decrease *

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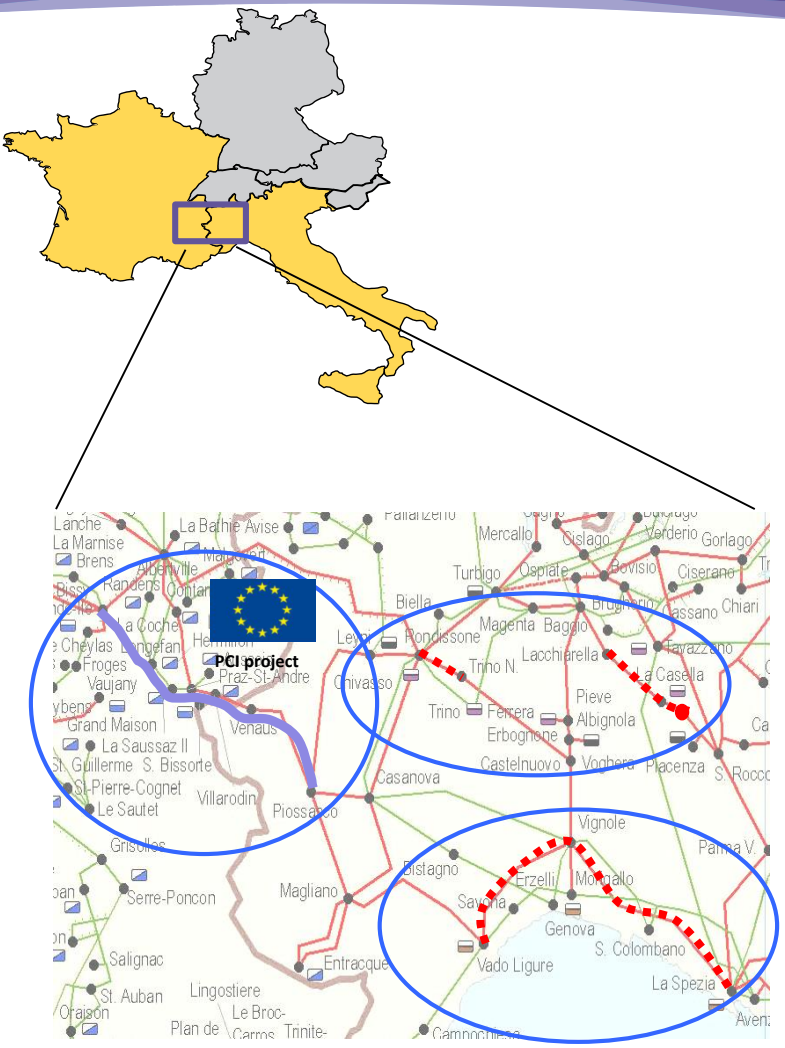
Example: project 21 – FR- IT Interconnection



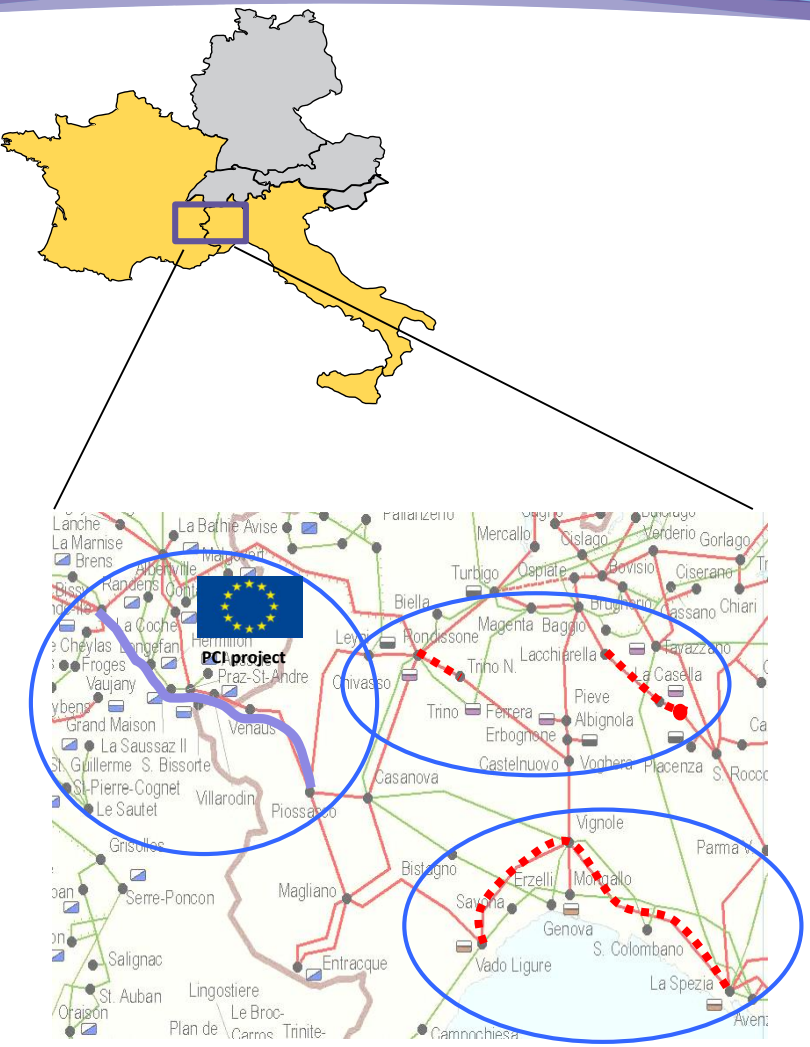
The project comprises a new HVDC link between France and Italy and the works to remove limitations on existing EHV internal Italian lines.

The project favours the market integration between Italy and France as well as the use of the most efficient generation capacity; it also increases possible mutual support of both countries.

In addition, the project can contribute to RES integration in the European interconnected system by improving cross border exchanges and system balances.

Example: project 21 – FR- IT Interconnection

Draft results V1

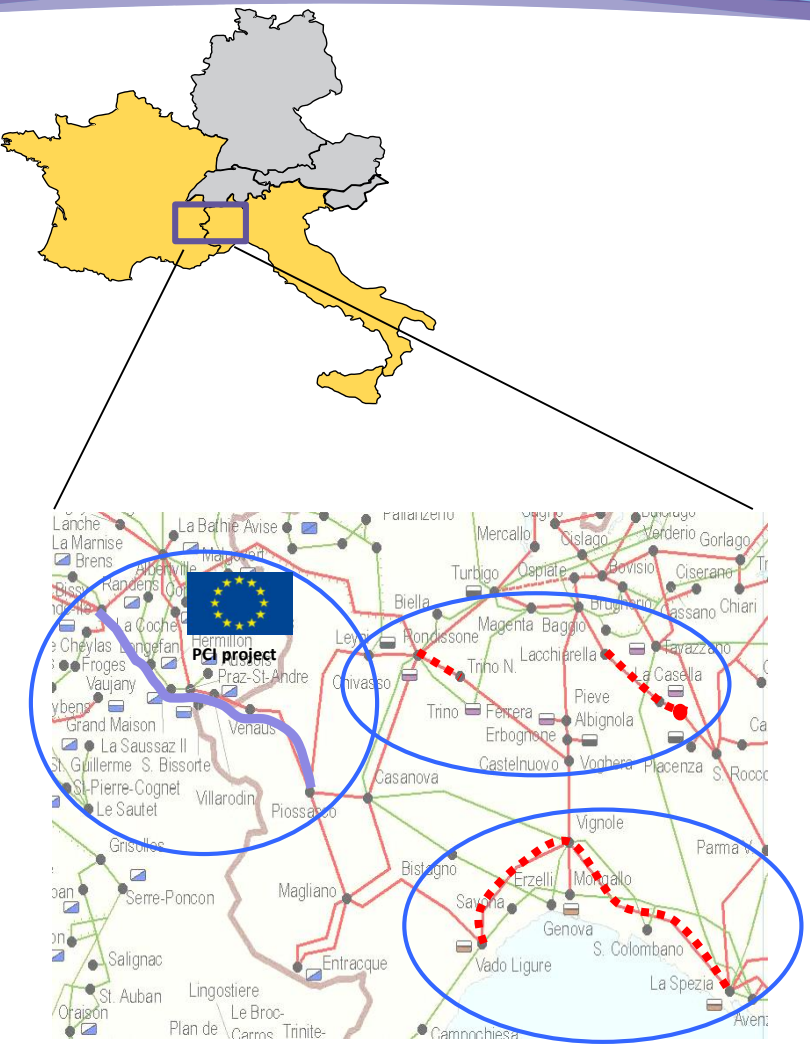


France-Italy Interconnection Development	
Short description	Planned development of the FR-IT interconnection to increase its capacity (including 1 PCI)
Investments included in the project	✓ New HVDC Savoie-Piemont *(about 190 km underground cable)* ✓ Removing limitations on 3 internal 400kV OHLs in Italy
GTC Increase	FR – IT: 1200 MW IT – FR: 800 MW
Investment cost	1000 – 1500 M€
B1: Security-Of-Supply	< tool accuracy
B2: SEW	43 M€/year*
B3: RES Integration	< tool accuracy
B4: Power Losses	20 GWh/year increase (use of HVDC)
B5: CO2 emissions variation	440 ktons/year increase (coal replaces gas) *

* The numbers do not take into account the uncertainty on the results inherent to long term planning. Ranges may be defined later in the process to account on it.

Example: project 21 – FR- IT Interconnection

Draft results V4



France-Italy Interconnection Development	
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Investments included in the project	✓ New HVDC Savoie-Piemont *(about 190 km underground cable)* ✓ Removing limitations on 3 internal 400kV OHLs in Italy
GTC Increase	FR – IT: 1200 MW IT – FR: 800 MW
Investment cost	1000 – 1500 M€
B1: Security-Of-Supply	< tool accuracy
B2: SEW	323 M€/year*
B3: RES Integration	460 GWh/year
B4: Power Losses	30 GWh/year increase (use of HVDC)
B5: CO2 emissions variation	1500 ktons/year decrease *

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Example: Project 148 IT – SI interconnection

The project consists in the new 400 kV overhead cross-border line Udine – Okroglo, including a PST in the Okroglo substation in Slovenia and the 400 kV overhead internal line in Italy between West Udine and Redipuglia. The internal reinforcements are necessary to allow the realization of the interconnection and to take full advantage of the increase of interconnection capacity provided by the cross-border line.

By increasing the GTC on the IT northern border, the project provides stronger market integration between IT and SI and broader region.

The project contributes to RES integration in the interconnected system.

Taking into account of the very limited number of present lines interconnecting Slovenian and Italian systems, the project also increases significantly the system operational resilience.

Example: Project 148 IT – SI interconnection

Draft results V1

IT – SI interconnection project	
Short description	Planned development of the IT-SI interconnection (including 2 PCIs)
Investments included in the project	New double circuit 400 kV Udine S-Okroglo (120 km) New 400 kV W. Udine Redipuglia New PST in Okroglo
GTC Increase	SI – IT: 800 MW IT – SI: 400 MW
Investment cost	220 M€
B1: Security-Of-Supply	< tool accuracy
B2: SEW	31 M€/year*
B3: RES Integration	< tool accuracy
B4: Power Losses	100 GWh/year decrease
B5: CO2 emissions variation	220 ktons/year increase (coal replaces gas) *

* The numbers do not take into account the uncertainty on the results inherent to long term planning. Ranges may be defined later in the process to account on it.

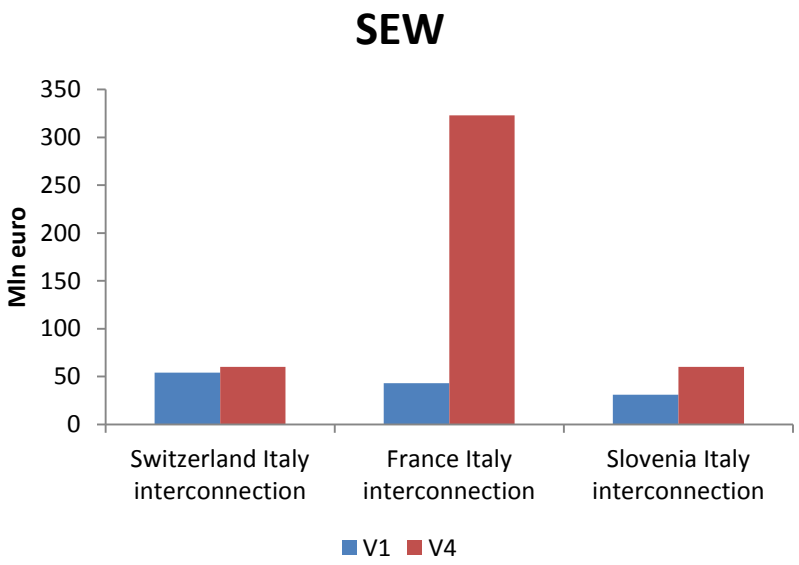
Example: Project 148 IT – SI interconnection

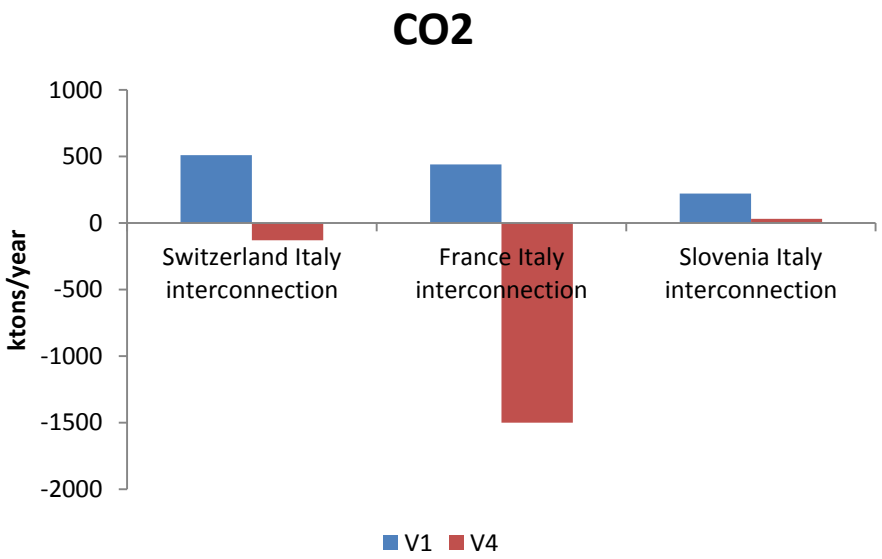
Draft results V4

IT – SI interconnection project	
Short description	Planned development of the IT-SI interconnection (including 2 PCIs)
Investments included in the project	New double circuit 400 kV Udine S.-Okroglo (120 km) New 400 kV W. Udine Redipuglia (40 km) New PST in Okroglo
GTC Increase	SI – IT: 800 MW IT – SI: 400 MW
Investment cost	220 M€
B1: Security-Of-Supply	< tool accuracy
B2: SEW	60 M€/year*
B3: RES Integration	neutral
B4: Power Losses	240 GWh/year decrease
B5: CO2 emissions variation	30 ktons/year increase *

* The numbers do not take into account the uncertainty on the results inherent to long term planning. Ranges may be defined later in the process to account on it.

Outcomes of interconnection projects assessment V1 vs V4





Outcomes of interconnection projects assessment V1 vs V4

For the above shown projects

- Significant benefits in terms of market and RES integration are provided in both scenarios V1 & V4
- SEW of the projects increase from V1 to V4
- CO2 emissions are variable and change with projects and Visions due to the different amount and use of generation capacities (coal, gas, nuclear, RES); in general CO2 emissions are more reduced in V4
- potential improvements could come from the projects in terms of SOS and resilience of future interconnected system

Next steps

Assessment of Vision 3 and Vision 2, to be finalized before the consultation of the TYNDP 2014