How to unlock private Investments for Energy Infrastructure – a CBA on the Apollo-Link HVDC Interconnector

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What is the problem?

There is no transition without transmission!

EUROPEAN COMMISSION

Grids, the missing link - An EU Action Plan for Grids
"Overall, the Commission estimates that EUR 584 billion in investments are necessary for the electricity grids this decade."

iea International Energy Agency

"…need for over 80 million km of grids around the world by 2040 – the equivalent of today's entire existing global grid…"

European Investment Bank

"2 to 3 times of today's annual investments needed"

"underlines that commitment and financing for grids, including from the EU level as well as private financing, should be adequate and based on long-term planning, in line with the objective to achieve net zero emissions by 2050"

Council of the European Union

"unprecedented investment needs in electricity networks in order to ensure a highly interconnected, integrated and synchronised European power system to achieve the EU's decarbonisation, competitiveness and security of supply objectives"

Still, the incumbent TSOs do not manage to cover the need and close the gap in investments.

entsoe

"…Investment need of **6 Billion Euros per year** until 2040…"
"The remaining **50 GW of needs** are left to be addressed, by all possible means. This is a considerable investment gap to be tackled **until 2040**."

Introducing an innovative approach for the development of infrastructure projects

Identification	Analytical approach to identify new projects in Europe with the highest economic and societal benefits in a project portfolio
Implementation	Once a defined maturity level is reached, spin-off into special purpose vehicles with the participation of strategic partners (e.g. TSOs)
Finance	In addition to classic forms of financing, development of digital instruments (NFT, tokens, crowd funding, etc.) for all project phases
Regulation	Proposed regulatory framework guarantees distribution off excess returns to network users and ensures adequate returns to investors

With an innovative business model, EUROPA-LINK is breaking new ground in closing the investment gap in the European transmission grid

The overarching aim is a significant contribution to the energy transition

Network fees	Fully regulated interconnectors reimburse excess returns from congestion revenues generated to grid users.
Broad participation	Broad sections of the population can participate via digital financing instruments and thus become part of the energy transition.
Investment	Interconnectors are privately developed and financed, thus relieving the planning resources and investment budgets of the national transmission system operators.
Security of Supply	Interconnectors increase the resilience of the European electricity grid. Dependence on imports of fossil fuels is decreasing.
Environment	Additional transfer capacity reduces the curtailment of RES generation and stabilizes market prices – incentives for investments are created and greenhouse gas emissions are avoided. The east-west connection allows the solar radiation to be used for considerably longer.

EUROPA-LINK is making a significant contribution to achieving the European climate targets with innovative approaches

APOLLO-LINK Italy-Spain - Interconnector

Official TYNDP 2024 status “Under Consideration” – Click for more information

System needs identified by ENTSO-e

- Bidding zone border between Spain and Italy North did not exist in previous system need studies -> Identified by Europa-Link + basic technical & economical feasibility
- Submission of Apollo-Link project to the 2024 TYNDP process
- CBA based on ENTSO-e system modelling
- Application for PCI status for Apollo-Link project
- Updated ENTSO-e system needs study

The project is an HVDC interconnection between Spain and Italy through the Mediterranean Sea

APOLLO-LINK

Project proposal

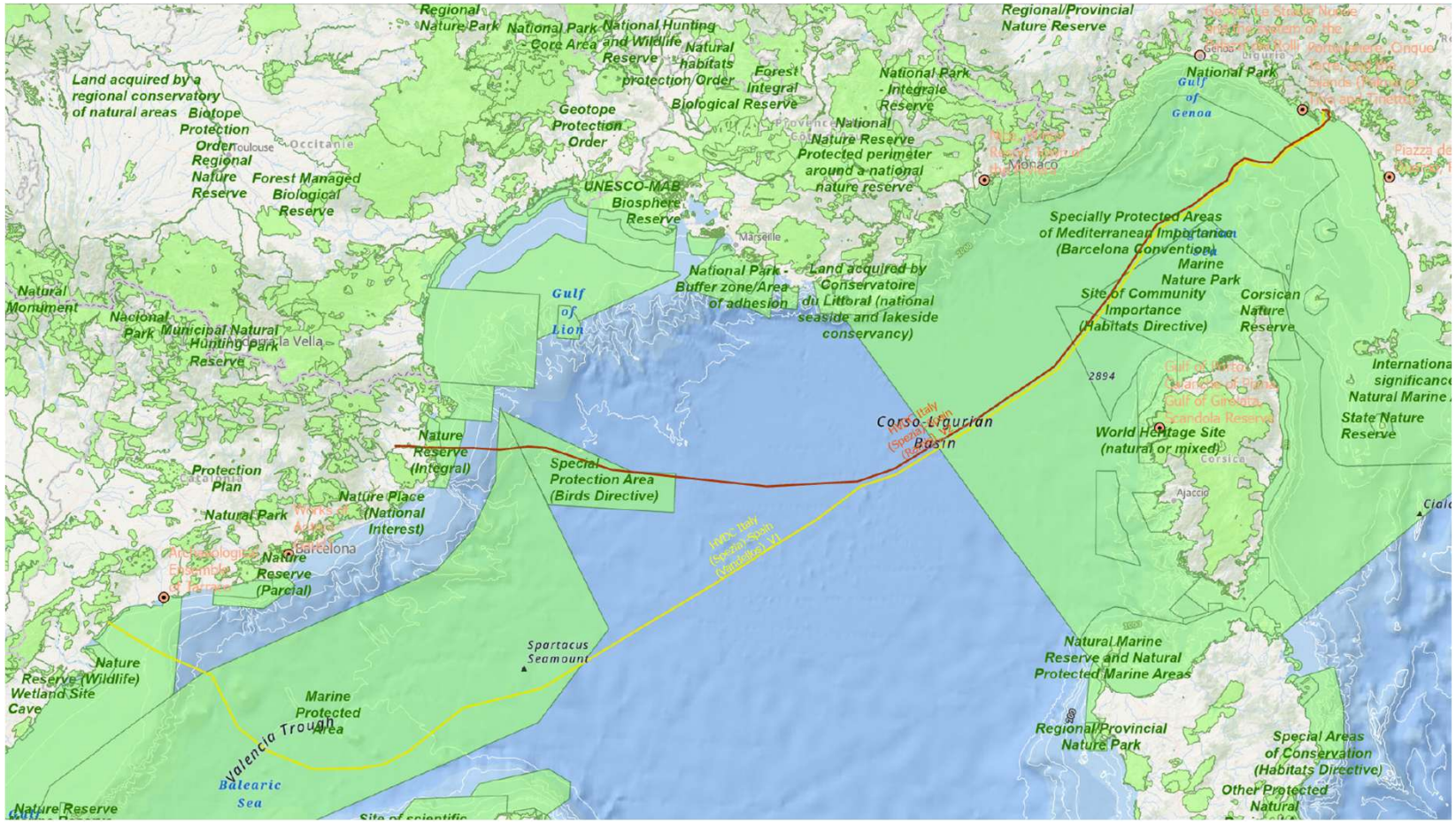
Additional information

- Part of ENTSOE's **Ten-Year Network Development Plan 2024**

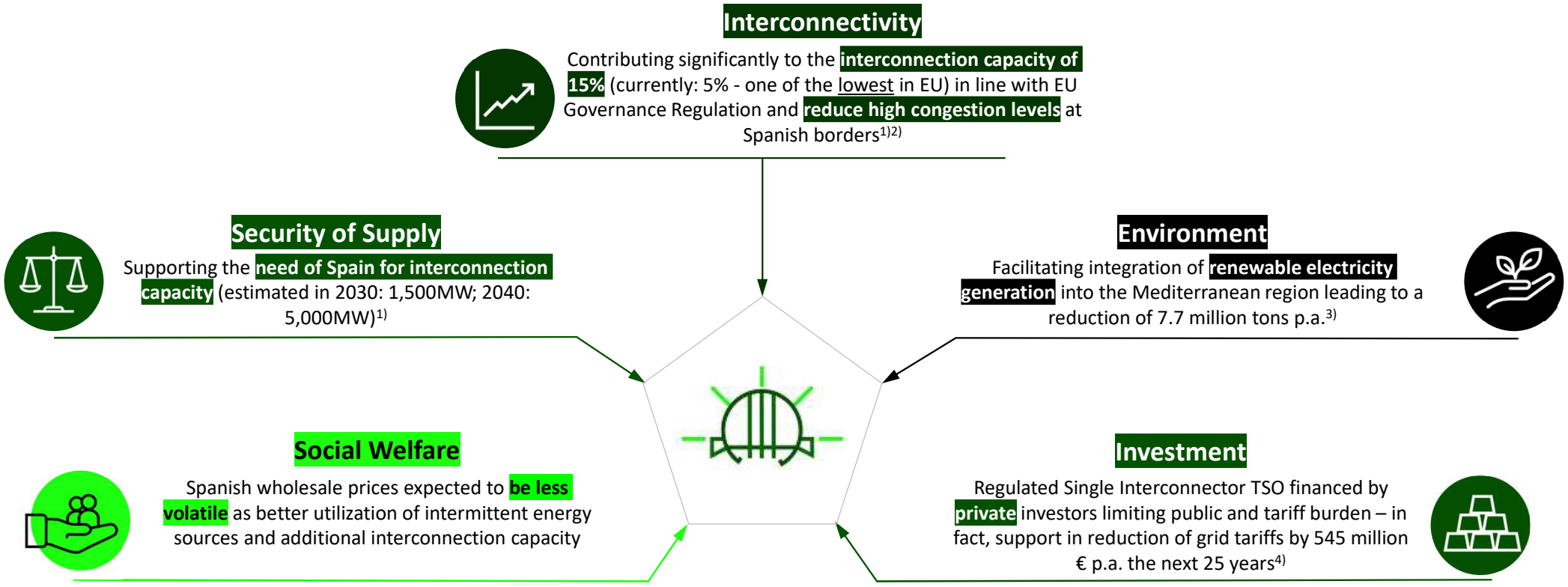
  TYNDP 2024 Project Collection (entsoe.eu)
- „Under consideration" in **Italian Network Development Plan 2025** by ARERA and Terna (see link)
- **PCI application** in progress
- **New** interconnection between Italy and Spain through the Mediterranean Sea[1)]
- Bird-fly distance of **~600km**[2)]
- **Standard HVDC technology**: Bipolar HVDC VSC converters: 525kV
- **Added interconnection capacity** of 2GW (substantial increase by **approx. 13%** of interconnection capacity in Spain)
- Commercial operation date (**COD**): 2032

1) Consideration of Natura 2000 areas in routing of interconnection
2) Final cable lengths usually include a 're-routing factor' multiplied with bird-fly distances (approx. 1.2 -1.3)

Routing options



APOLLO-LINK does additionally provide significant benefits for Spain's society



1) See Transmission Network Development Plan 2021-2026 period: Link; (2) See Spain's National and Energy Climate Plan: Link; (3) Own calculation based on expected volumes of electricity exchanged; (4) Own calculation based on expected price spreads ES-IT in years 2030 and 2040 of the national trend scenario of the TYNDP 2024

APOLLO-LINK significantly stands out compared to other interconnectors in the TYNDP at European level

Compared to all European transmission projects

Project	Capacity in MW	Costs in billion €	Socio-economic welfare in mln €[1] in 2030 (2040)	Reduction in CO_2 – emissions in kt in 2030 (2040)
1. Xlinks	3,600	14.5	1,585 (1,551)	4,708 (1,308)
2. North Sea Wind Power Hub	> 2,000	19.5	1,407 (1,346)	7,575 (1.,929)
3. Suedlink	4,000	10.6	845 (1,366)	1,589 (2,271)
4. HVDC A-Line	2,400	3.1	812 (1,479)	1,664 (2,527)
5. Green Aegean Interconnector	3,000	8.0	757 (1,152)	3,732 (2,839)
6. APOLLO-LINK	2,000	3.1	547 (860)	2,634 (1,755)

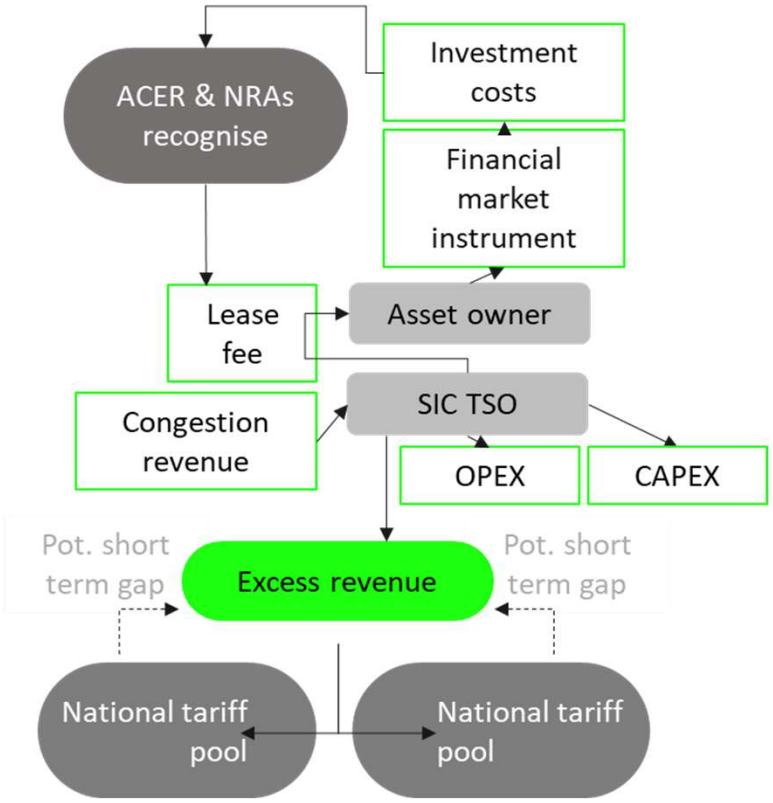
Compared to "peer"[2] projects

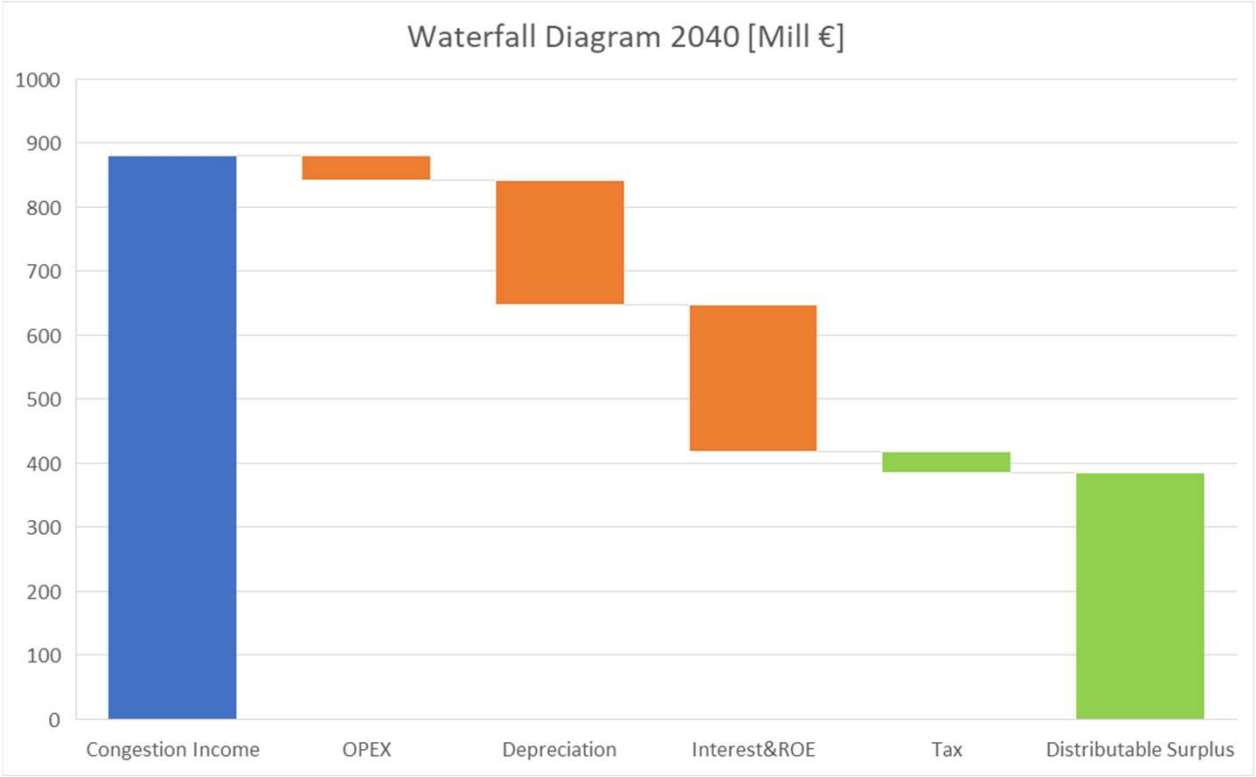
Project	Capacity in MW	Costs in billion €	Socio-economic welfare in mln €	Reduction in CO_2 – emissions in kt
APOLLO-LINK	2,000	3.1	547 (860)	2,634 (1,755)
Biscay Gulf	2,000	3.1	372 (695)	1,662 (704)
North Tyrrhenian Corridor	2,000	2.7	49 (239)	208 (615)
Medlink	4,000	7.8	545 (517)	5,839 (2,571)
Aragón-Atlantic Pyrenees	2,000	2.5	206 (464)	941 (469)
NeuConnect	1,400	2.1	297 (403)	739 (42)

APOLLO-LINK ranks as the **6th best project** across Europe in terms of socio-economic welfare (SEW) when compared to all interconnector projects from the TYNDP (both existing and new). Among regionally close and technically similar projects, it even achieves the **top position**

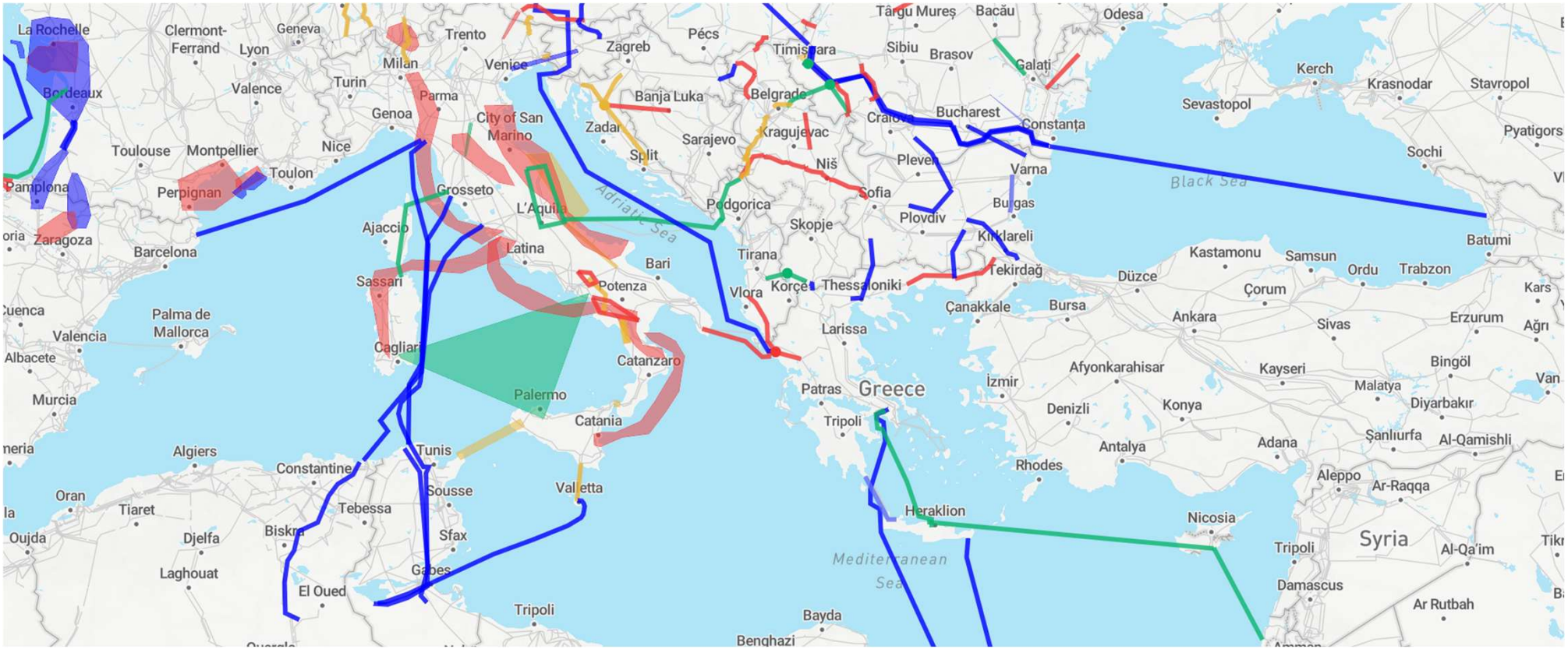
1) Socio-economic welfare considers the absolute value of social welfare for the European electricity system & society if project is being realised
2) Regionally close and technically similar projects to APOLLO-LINK from the TYNAP 2024

Distribution of surplus congestion income – single-interconnector TSO regulation model





…other business in the Mediterranean



thank you

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