

AN INTEGRATED GRID FOR ENABLING THE ENERGY TRANSITION IN THE MEDITERRANEAN

Mediterranean Project 2 Closing Conference

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MEDITERRANEAN MASTER PLAN II

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Emission target

Roadmap to “net zero”

Actual 2018:

-23%



Target 2030:

-55%

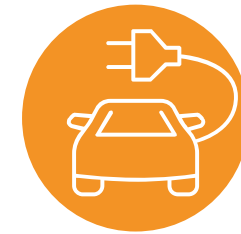


Target 2050:

Net zero emissions

Key actions

Main lever for reaching this goal



Transportation: massive deployment of **BEVs** and low emission **bus/truck**



Energy efficiency and electrification of the heating sector



80%-90% FER power generation @ 2050



Batteries, hydrogen & CCS deployment \for full decarbonization of power gen



Relevant projects in networks to improve interconnections and digitization



EUROPEAN OUTLOOK

GREEN NEW DEAL

1.000 Bn

€

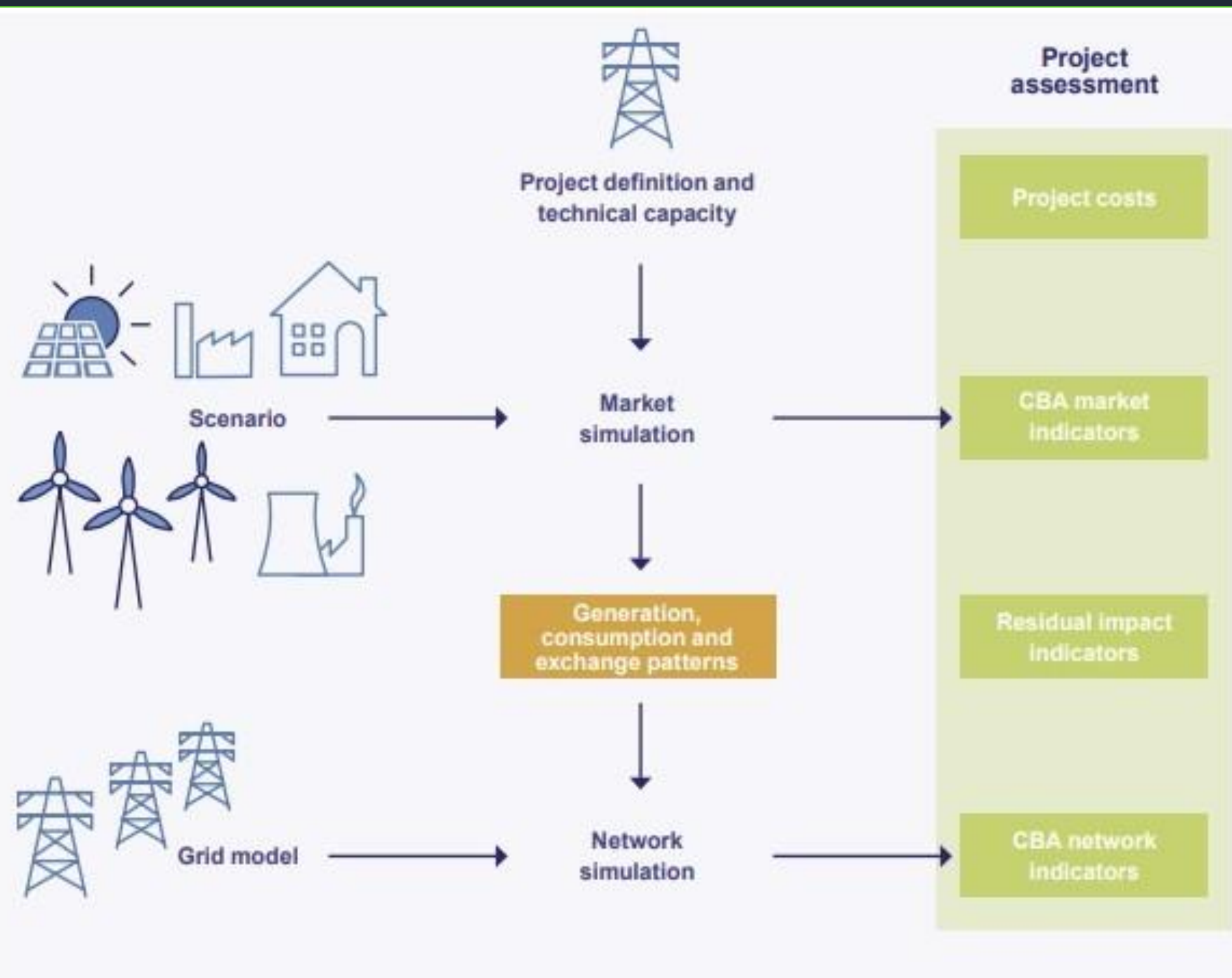
of investments in 10 years

The European Green New Deal lays the foundations for a new strategy of all operators in the energy supply chain in order to adapt their development plans to become the enablers of the transition.


Project assessment framework

The Long-term Network development Plan” includes the following main actions:


- Definition of Mediterranean scenarios;
- Definition of the list of future interconnection projects;
- Creating reference models of power system at regional level to perform market studies;
- Analyzing the network behavior (load flow calculations) and the investments needed to fulfil the security requirements;
- Performing the Cost Benefits Analysis (CBA) for the new investments.



Power System Modelling And Cost Benefit Analysis

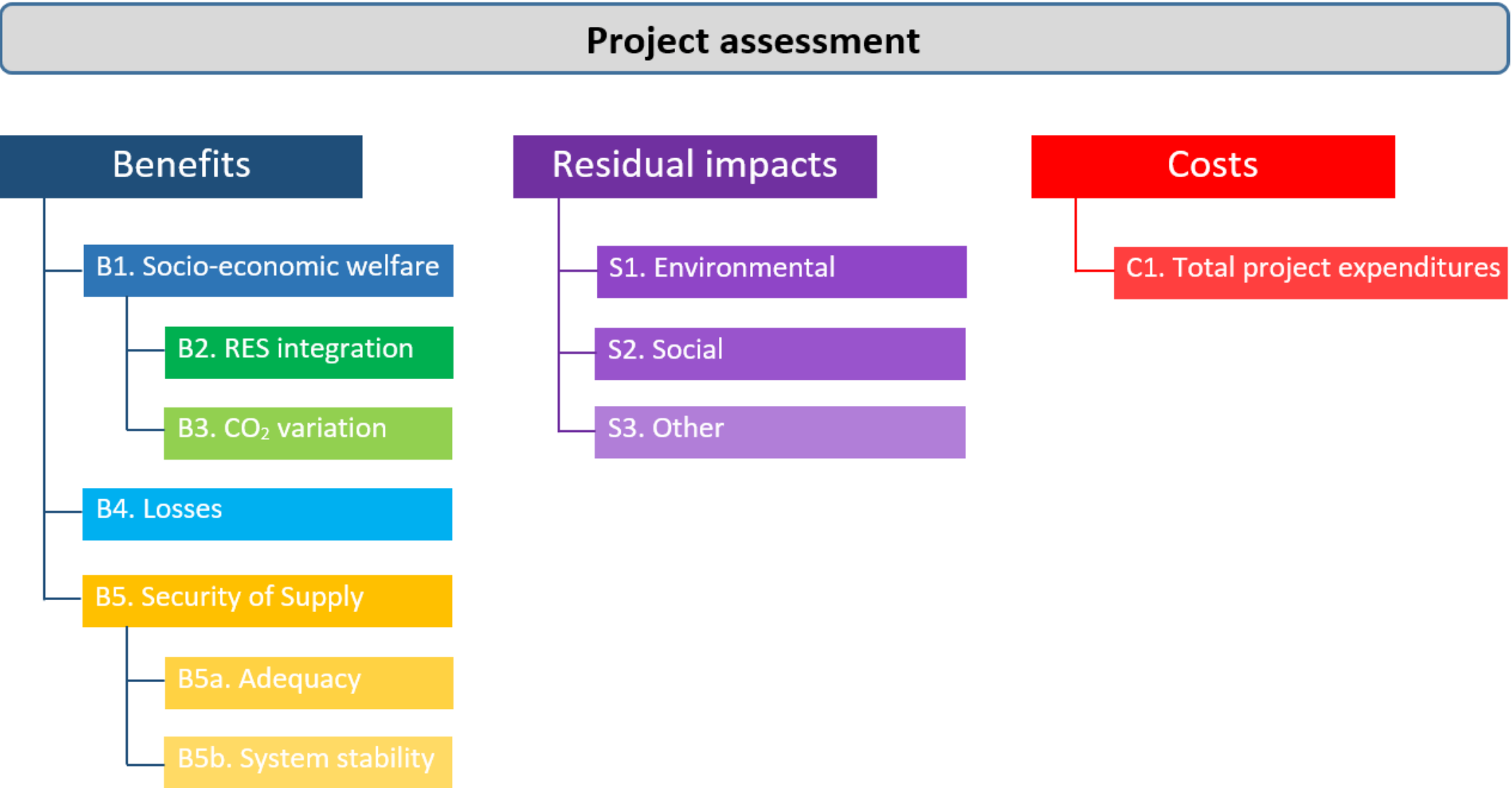


Modelling of thermal units, seasonal hydro reservoirs, storage systems, and intermittent generation

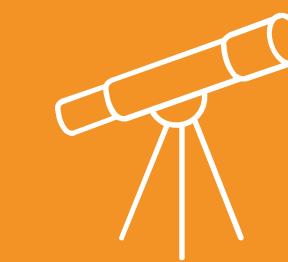
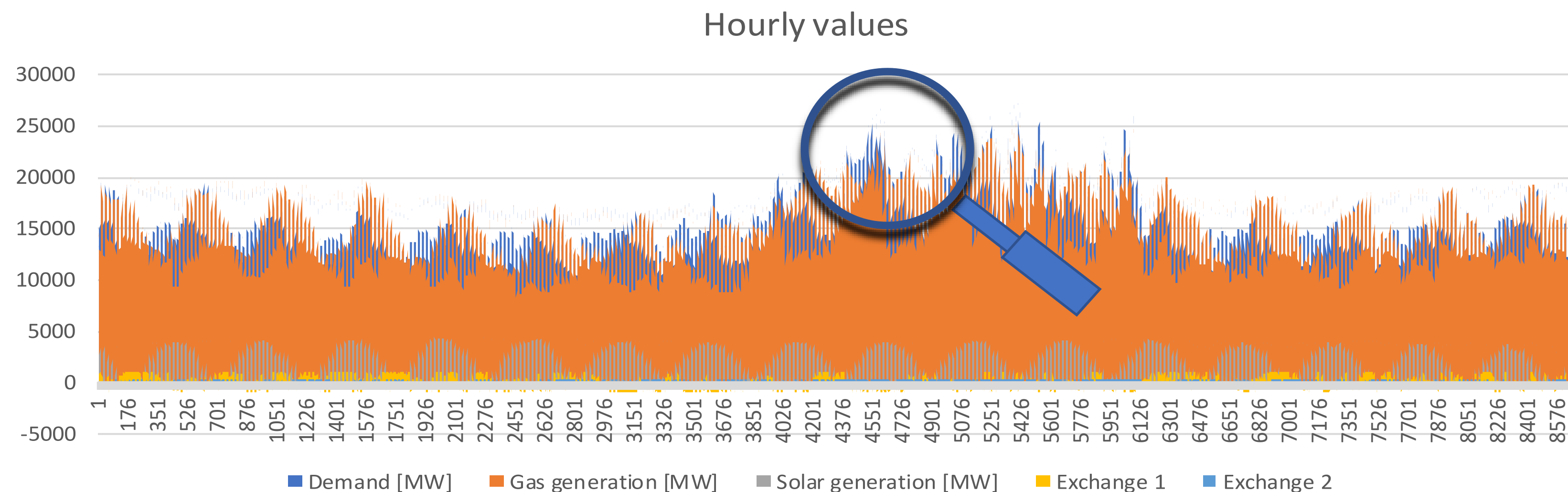


Construction of Monte-Carlo scenarios embedding several possible hourly time series of electrical demand, intermittent wind and solar generation, hydraulic inflows and availability of thermal units

CBA methodology is developed to evaluate the benefits and costs of new interconnection projects from a Mediterranean perspective, providing important input for the assessment of the interconnection projects considered in the Mediterranean Region. The main objective of this CBA methodology is to provide a common and uniform basis for the assessment of these projects



Point in time selection

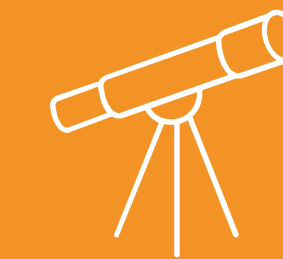
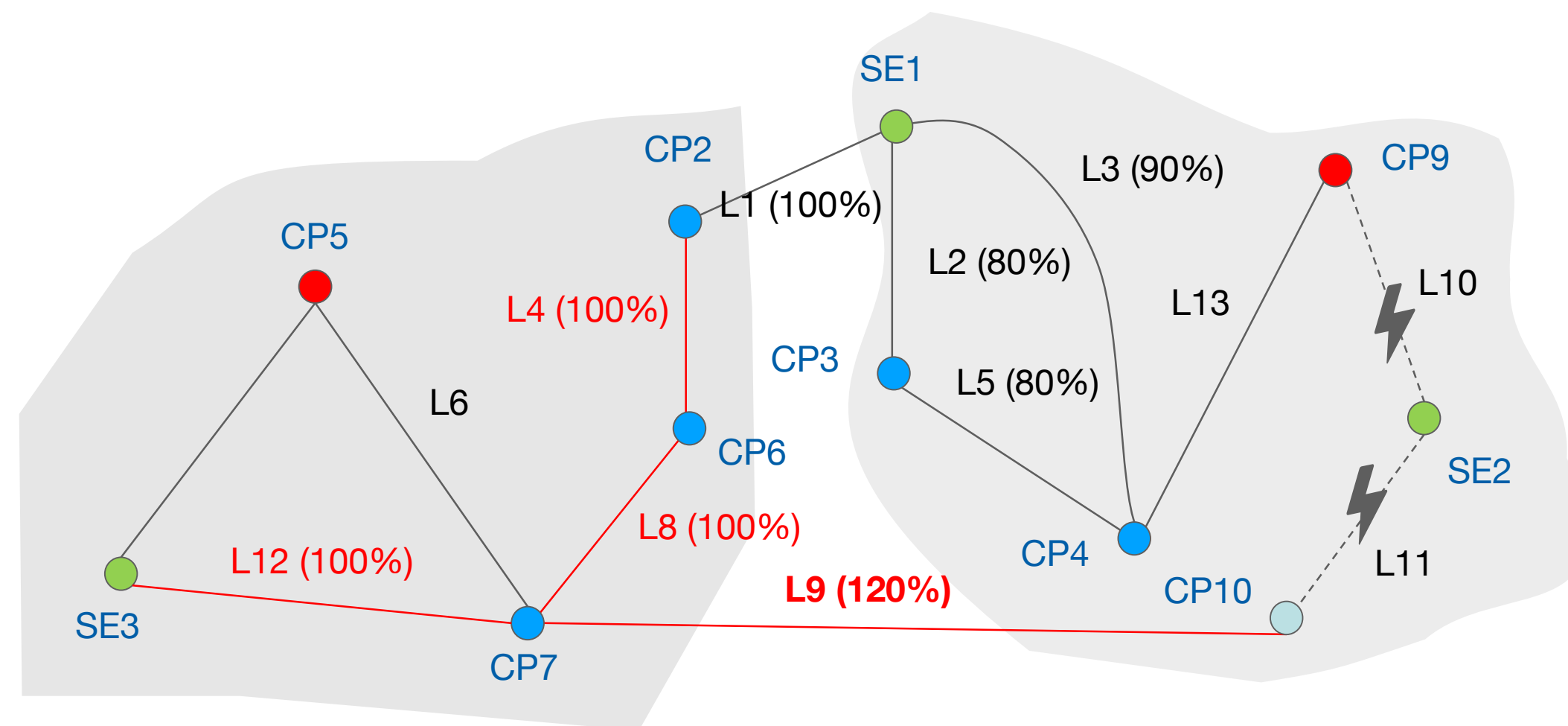


PITs definition is crucial to verify a wide variety of dispatching conditions that may result stressful for the network and in particular for the interconnection clusters

To define the distribution of PITs among different scenarios and clusters an initial screening has been done focusing on: exchanges, demand, balance, production from RES, conventional production. For each scenario and project, the analysis performed includes:

- analysis of possible correlation among variables
- distribution of variables values during the year subdivided by range
- duration curve for exchanges
- radar chart with the values of main variables in a number of significant PITs during the year to examine the relative values of the variables for a single data point (PIT) and to locate similar points or dissimilar points

Static security simulation in N and N-i conditions



Load flow studies compute the power flows and the bus voltages in a system subject to the regulating capability of generators, reactive power sources, and on load tap changer transformers.

Considering that the network includes a certain number of lines and transformers (N), N-1 and N-2 criteria are defined to verify the ability of the system to operate even facing the lack of one element (N-1) or two elements together (N-2).

Envisaged investment clusters

Market



Reduce high price differentials between different market nodes and/or countries

Dispatch, Adequacy and Security of Supply



Positively contribute to the integration of renewables



Contribute to solving adequacy and security of supply issues

Operation



Fully or partially contribute to resolving the isolation of countries in terms of power system connectivity or to meeting specific interconnection targets



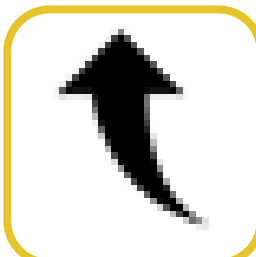
Introduce additional System Restoration mechanisms



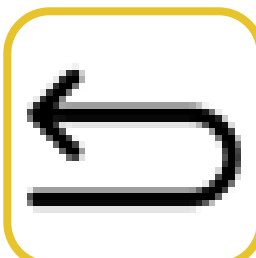
Improve system flexibility and stability



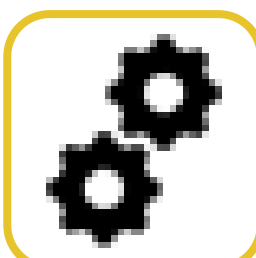
Increase system voltage stability



Enable cross-border flows to overcome internal grid congestions



Mitigate loop flows in bordering systems



Contribute to the flexibility of the power systems through the control of power flows

The projects merits are clustered showing the most relevant needs of the Mediterranean electricity system that the actual Mediterranean Project helps to solve.

The Mediterranean MasterPlan at a glance



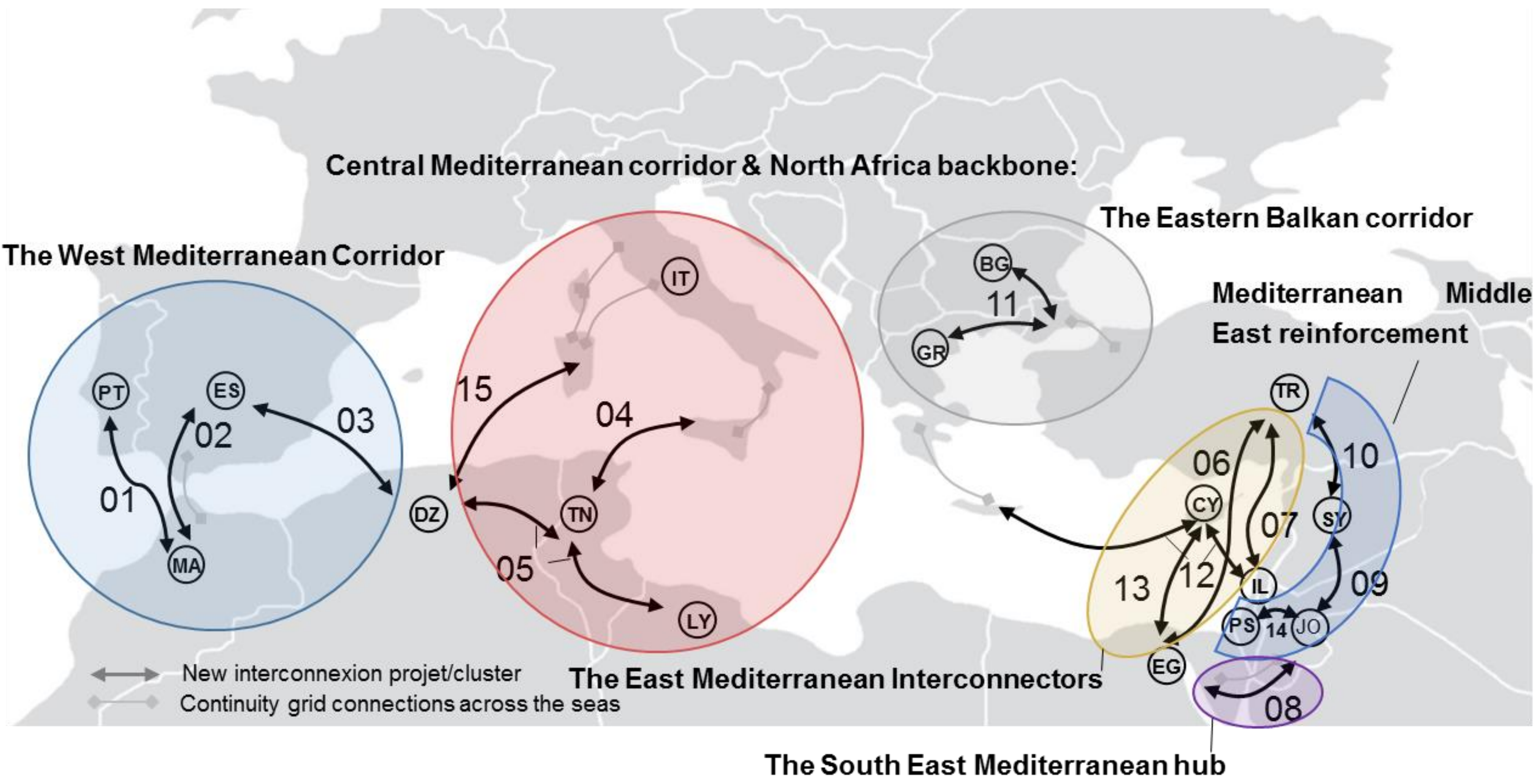
15 projects



+4100km HVDC



+18 GW capacity



NO.	INTERCONNECTION PROJECT / CLUSTER	Capacity [MW]	HVDC
1	MA-PT (Morocco – Portugal)	1000 MW	✓
2	MA – ES (Morocco – Spain)	900 MW	
3	DZ- ES (Algeria – Spain)	1000 MW	✓
4	TN – IT (Tunisia - Italy)	600 MW	✓
5	DZ – TN – LY (Algeria – Tunisia - Libya)	1000 MW/2000 MW	
6	TR – EG (Turkey - Egypt)	3000 MW	✓
7	TR – IL (Turkey – Israel)	2000 MW	✓
8	EG – JO (Egypt – Jordan)	550 MW	
9	JO – SY (Jordan – Syria)	800 MW	
10	SY – TR (Syria – Turkey)	600 MW	
11	GR- TR – BG (Greece - Turkey - Bulgaria)	500 MW/500MW	
12	IL- CY- GR (Israel – Cyprus – Greece)	1000MW/1000 MW	✓
13	EG- CY (Egypt – Cyprus), joint with project 12	1000 MW	✓
14	JO – PS (Jordan – Palestine)	100 MW	
15	DZ- IT (Algeria – Italy)	1000 MW	✓

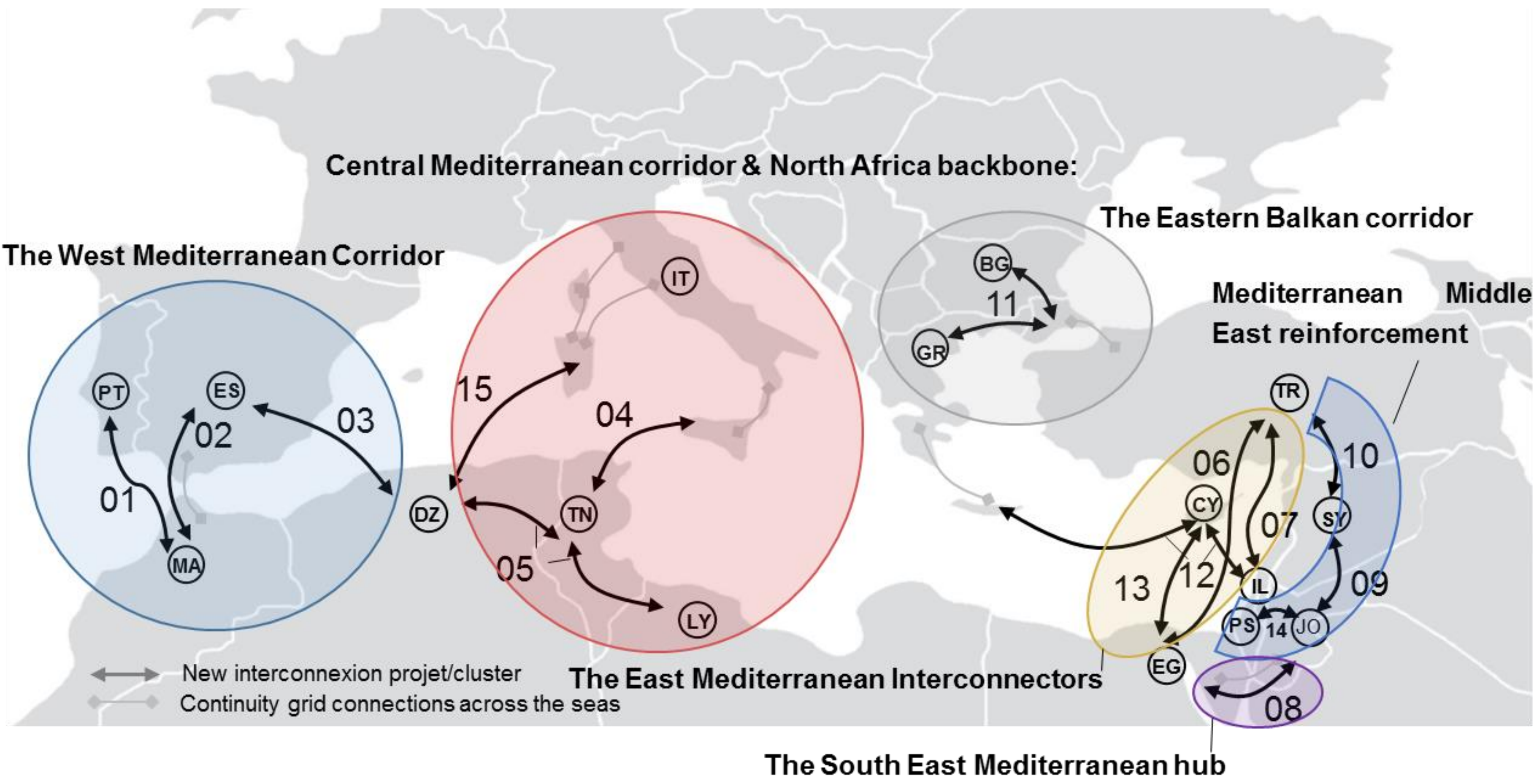
The Mediterranean MasterPlan at a glance



+5.800km overall
interconnection lenght



+\$12Bn aggregated
investment costs



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THANK YOU!