TEASIMED

Towards an Efficient, Adequate, Sustainable and Interconnected Mediterranean power system

14/12/2022, Arab Electricity Regulators Forum (AERF)

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Teasimed

TOWARDS AN EFFICIENT, ADEQUATE, SUSTAINABLE AND INTERCONNECTED MEDITERRANEAN POWER SYSTEM

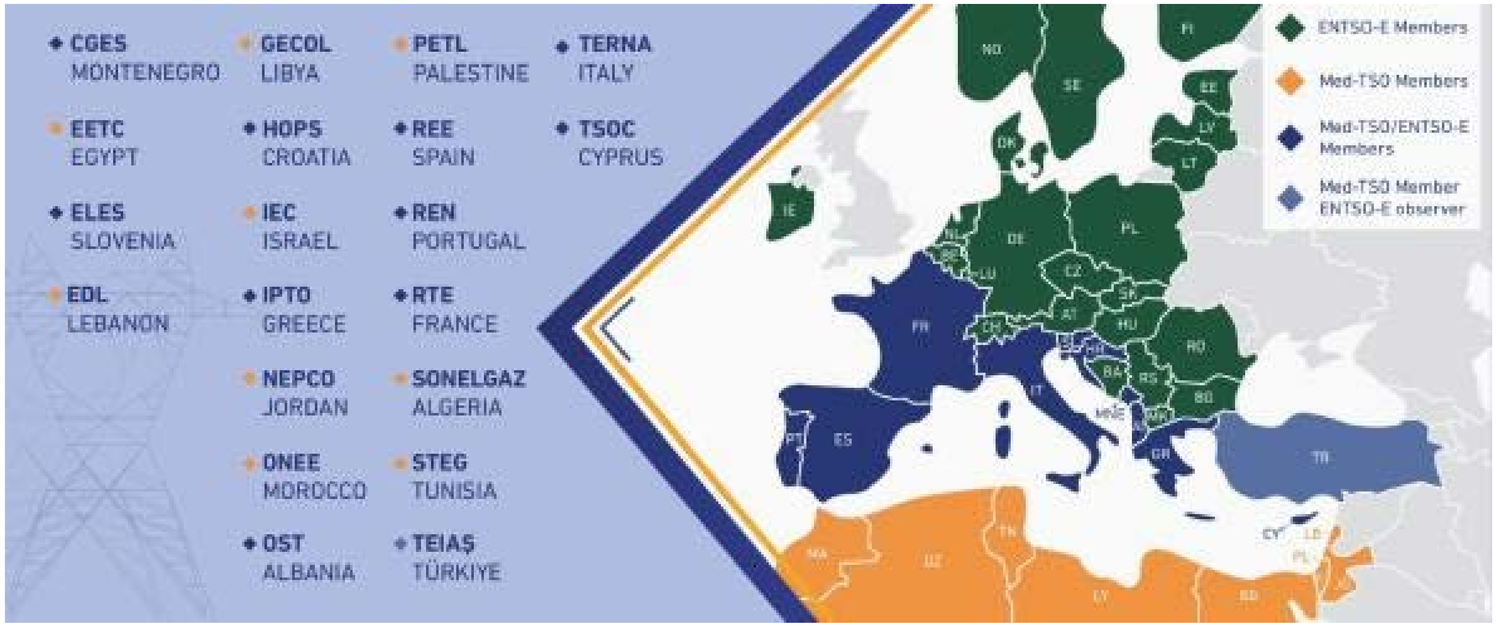
A project by

Med-TSO

MEDITERRANEAN TRANSMISSION SYSTEM OPERATORS

Co-funded by
the European Union

Med-TSO: multilateral cooperation in the Mediterranean



- **22** members from **20** Med countries
- **> 500 million** people served
- **~ 544.000 MW** installed capacity
- **~ 400.000 km** transmission lines
- **> 1600 TWh** electricity consumption

- **A bridge between Europe and the MENA Region,** acting as THE reference regional stakeholder for electricity
- Playing a regional reference role for creating a favorable climate for the **development of North-South and South-South interconnections**
- **Launching pilot projects** to strengthen the integration of the MENA Power Systems
- **Support the EC** in its Euro-Mediterranean initiatives
- **Bottom-up approach**

Main streams of Med-TSO's action plan

a — Coordinated planning

- Coordinated development of HV grid
- Med Masterplan

b — Common rules

- Power System interoperability
- Mediterranean Grid Code

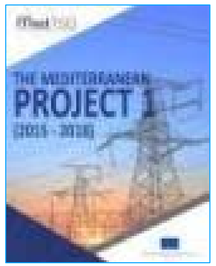
c — Capacity building

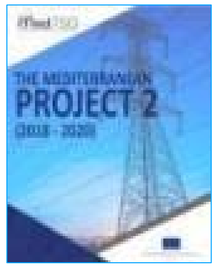
- Training
- Knowledge Sharing programs

d — Interconnected Electricity Exchange Zones

- Coordinated Adequacy assessments
- Enhance coordination in operations

2015 2018 2020 2022





Four EC-cofounded Projects

TeasiMed
TOWARDS AN EFFICIENT, ADEQUATE, SUSTAINABLE AND INTERCONNECTED MEDITERRANEAN POWER SYSTEM

TeasiMed 2 (2023-25)

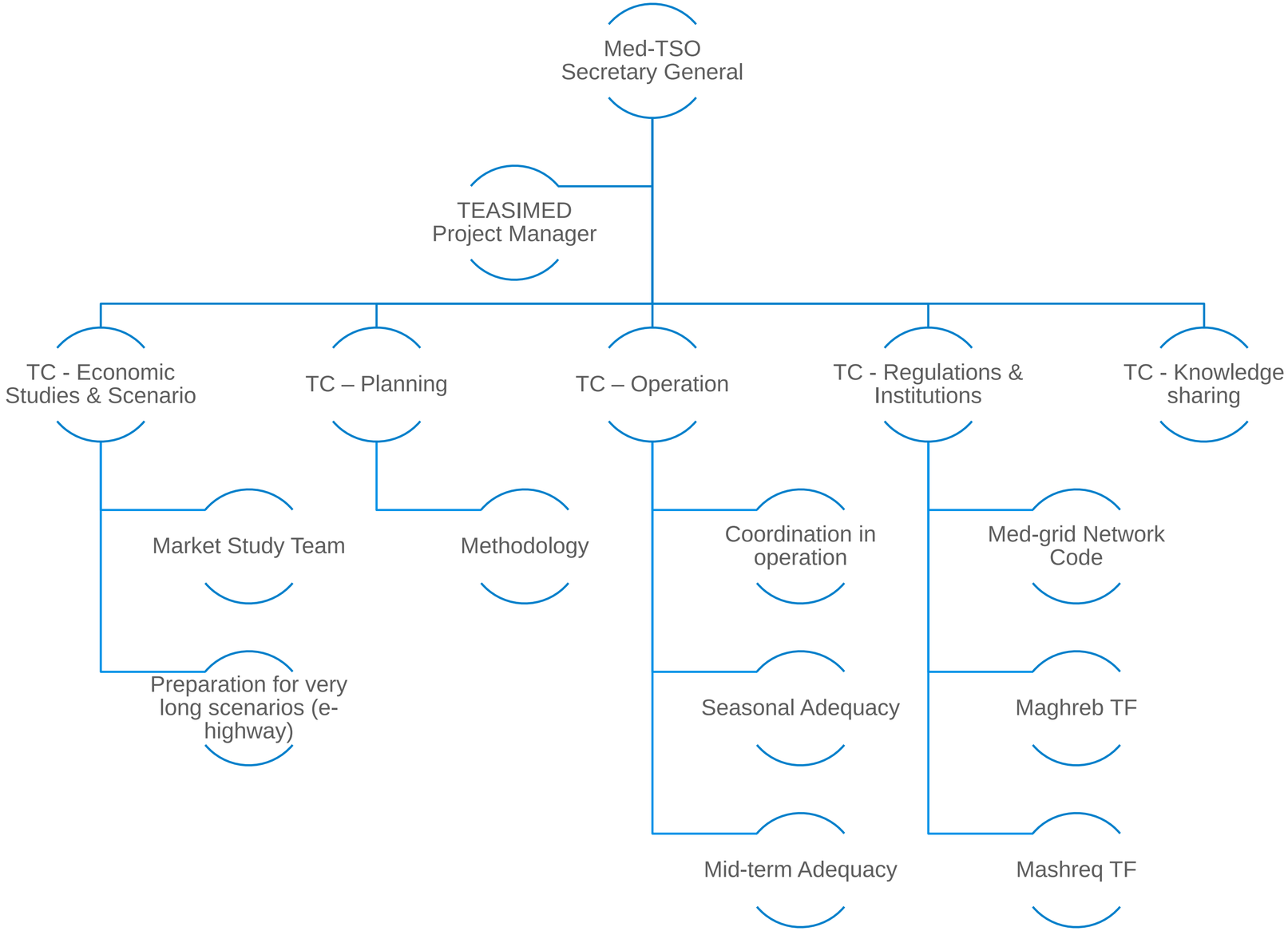
TEASIMED project

- Based on MP1 & MP2 results, the **European Commission** has granted to Med-TSO the **support for a new project to be carried out in the period 2020-2022**
- The new project **TEASIMED** (i.e. ***T****owards an* ***E****fficient,* ***A****dequate,* ***S****ustainable and* ***I****nterconnected* ***MED****iterranean power system*) started on 1 September 2020, with a duration of 28 months (conclusion by 31 December 2022)

Five working streams:

1. Update the **Mediterranean Masterplan**, the HV Transmission Network Development plan, in close connection with ENTSO-E
2. Consolidate the Common Technical Regulatory Framework (CTRF) to let it become a real **Mediterranean Grid Code**
3. Identify and put into operation **pilot projects** on selected **Interconnected Electricity Exchange Zones** (IEEZ), optimizing the calculation of interconnection capacities and applying joint operational procedures
4. **Optimized operation procedures** and **coordinated Adequacy assessments**
5. **Knowledge Sharing program**, also through the development of a digital web platform

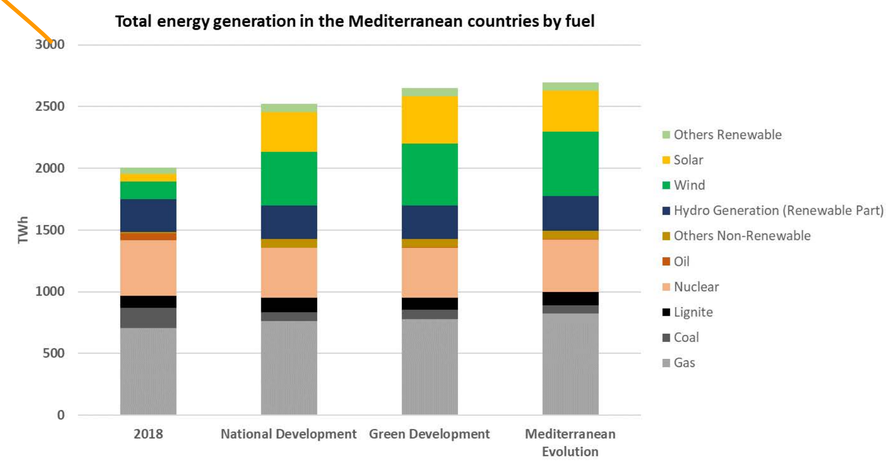
TEASIMED Steering & coordination committee



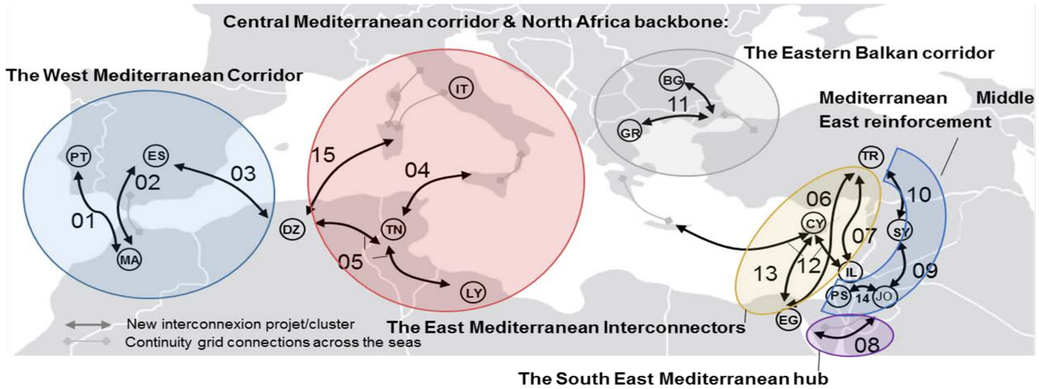
Med-TSO Mediterranean Master Plan 2022

1 - Identify main trends, drivers & uncertainties

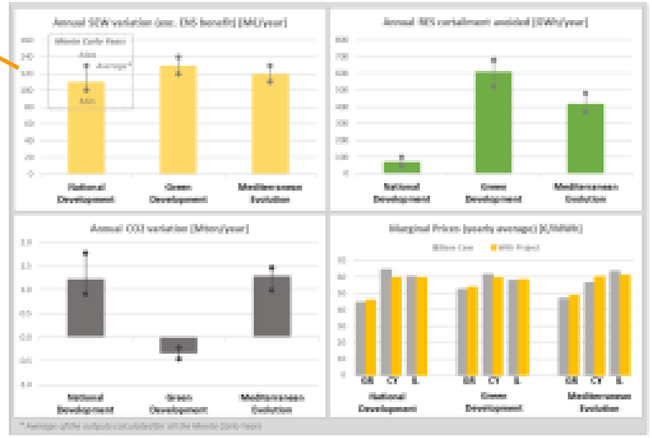
2 - Development of exploratory scenarios



3 - Collect list of projects after having defined common eligibility criteria



4 - Cost-Benefit assessments Market & Network Analysis



Med-TSO scenarios

National development

- positive but low option for long-term economic growth in the Mediterranean region
- moderate population growth
- commitments already made on RES and national energy policies
- limited effects of energy efficiency and modest electrification of uses

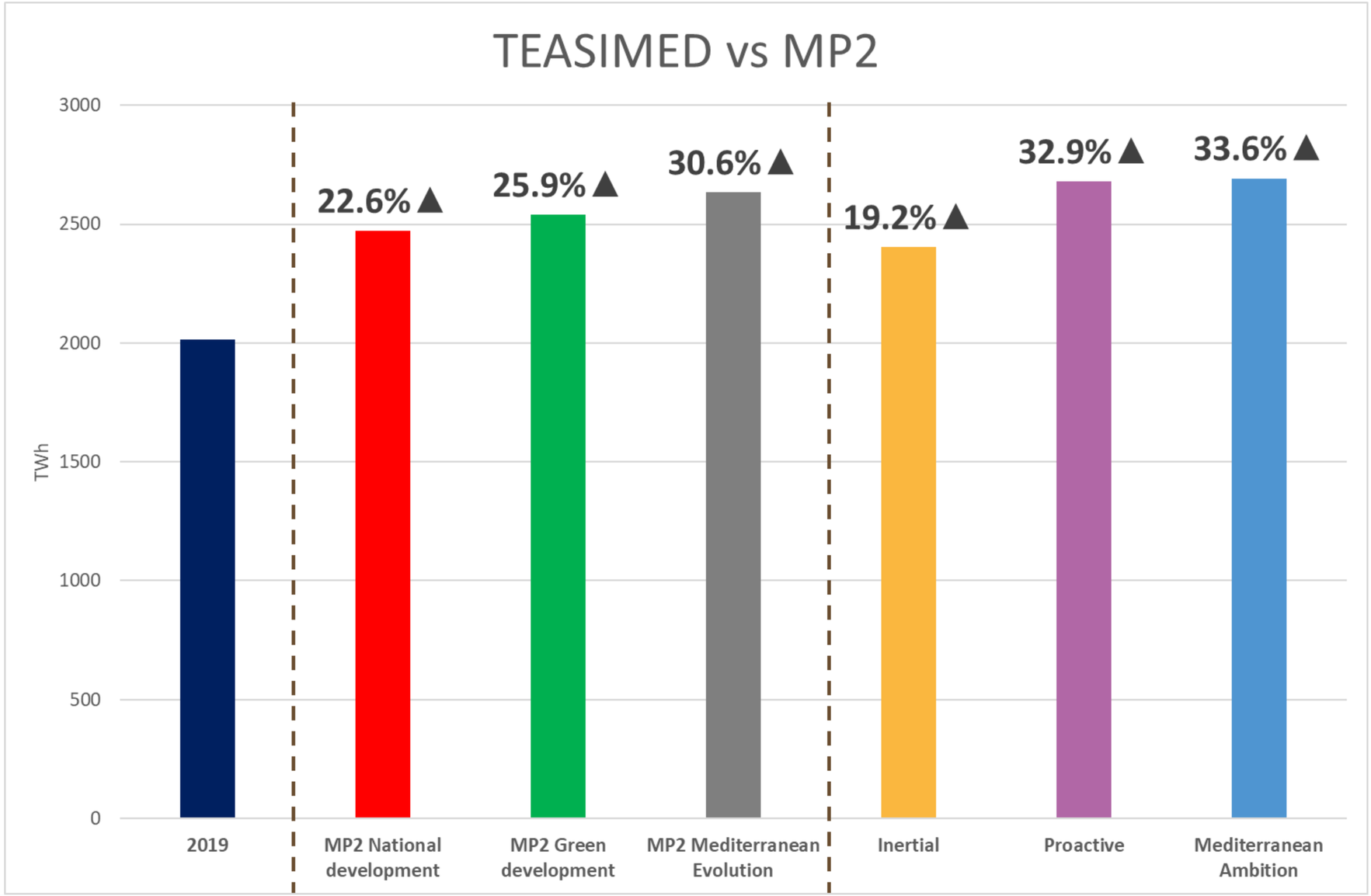
Green development

- Positive macroeconomic trends
- Development of large RES production facilities (decentralized + prosumers
- New uses of electricity to improve energy efficiency

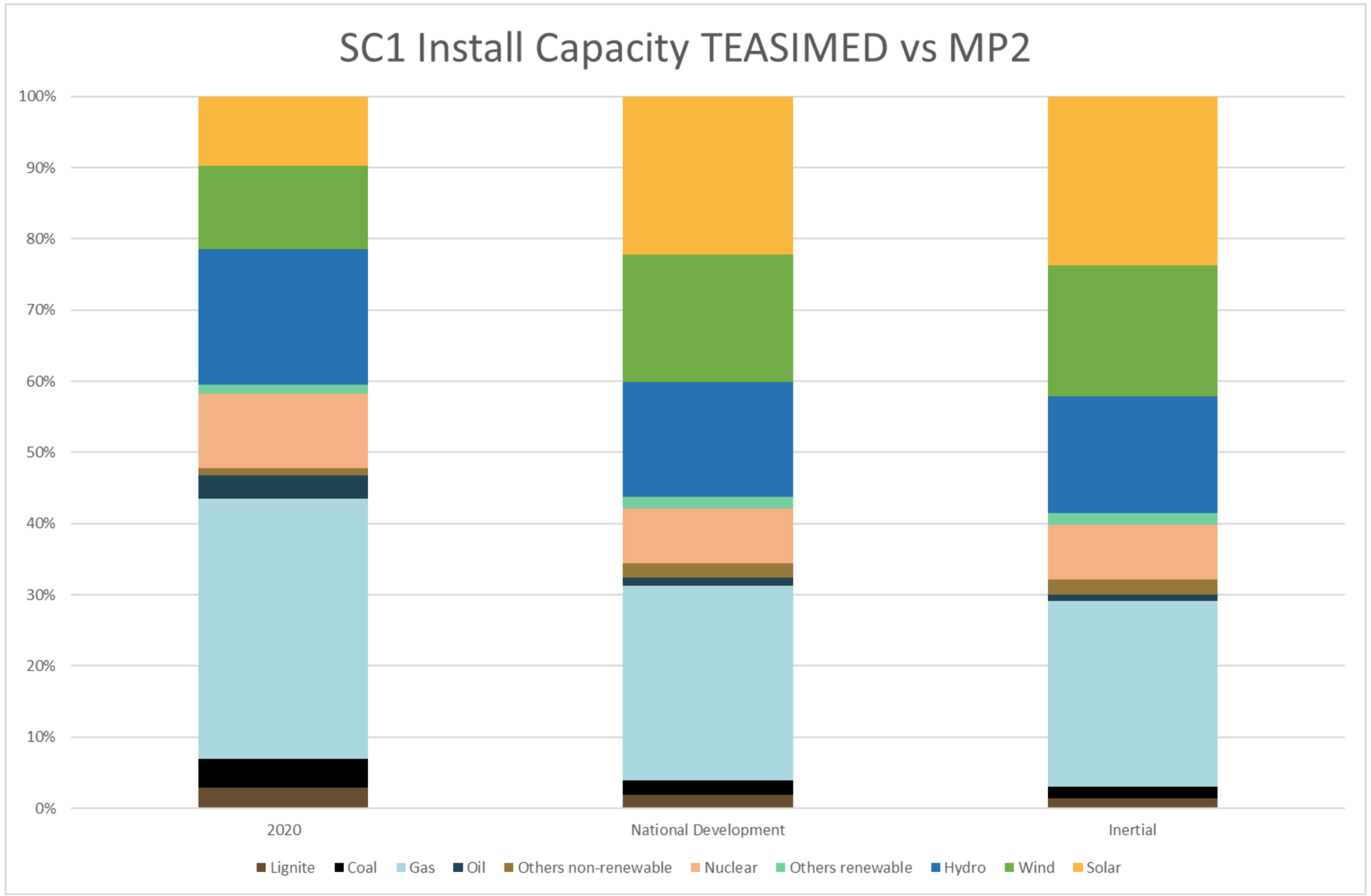
Mediterranean Evolution

- regional approach to the energy transition
- strong population growth (esp. MENA)
- development of industrial sectors and services
- regional cooperation for ambitious RES development and GHG reduction
- enhanced interconnections
- New uses of electricity to improve energy efficiency

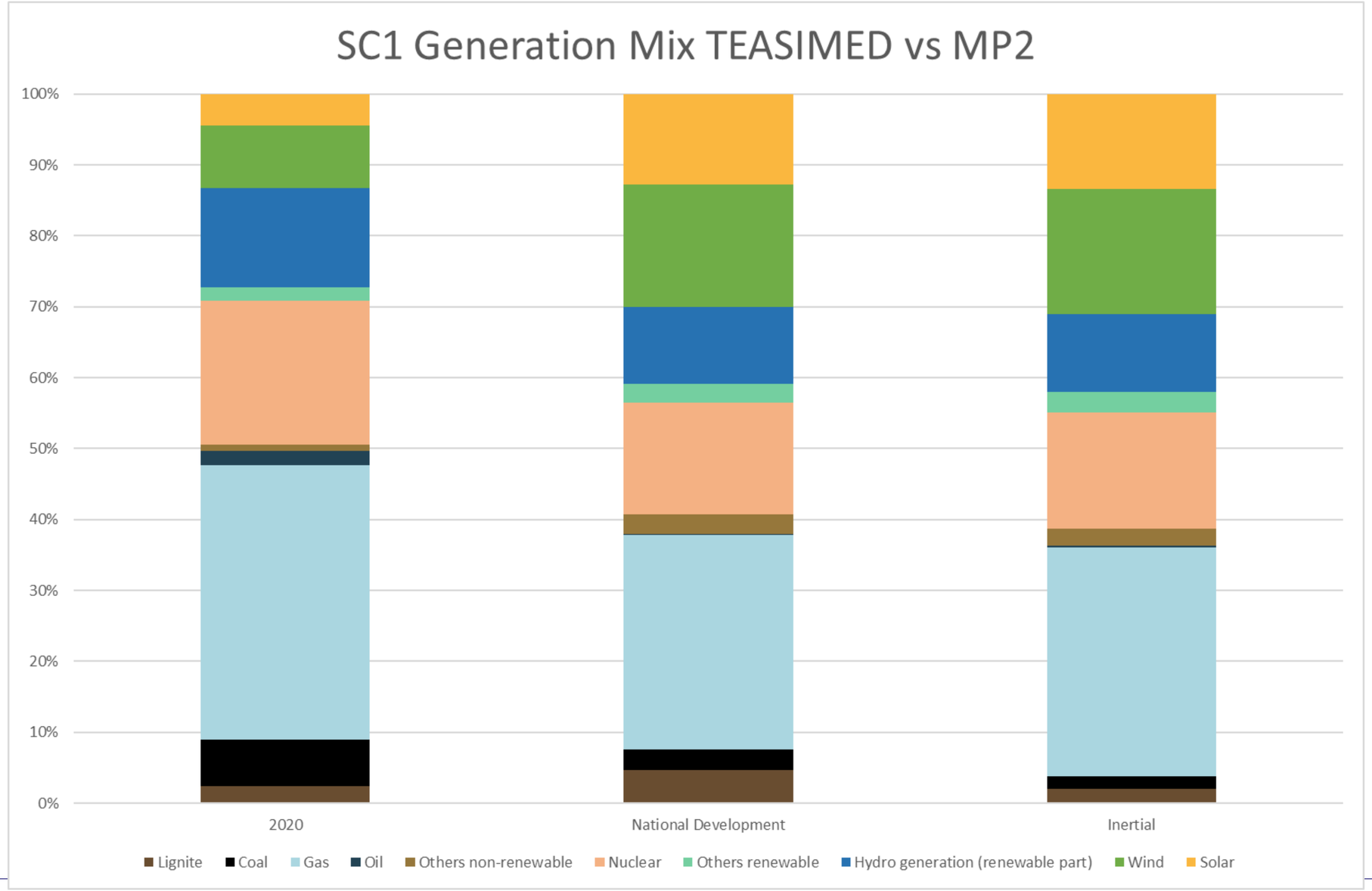
TEASIMED Scenarios - Load



TEASIMED Scenarios – Installed capacity



TEASIMED Scenarios – Generation



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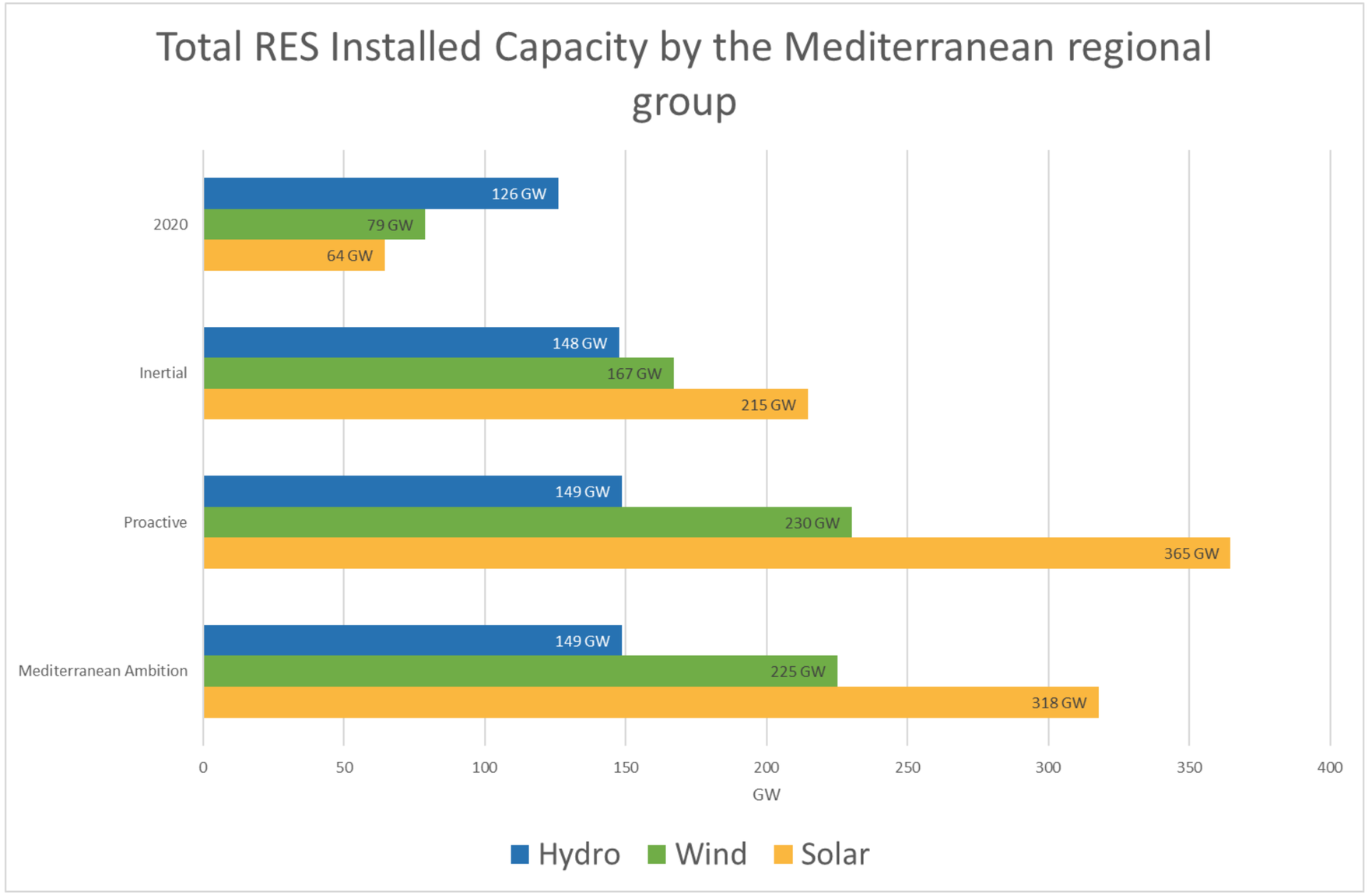
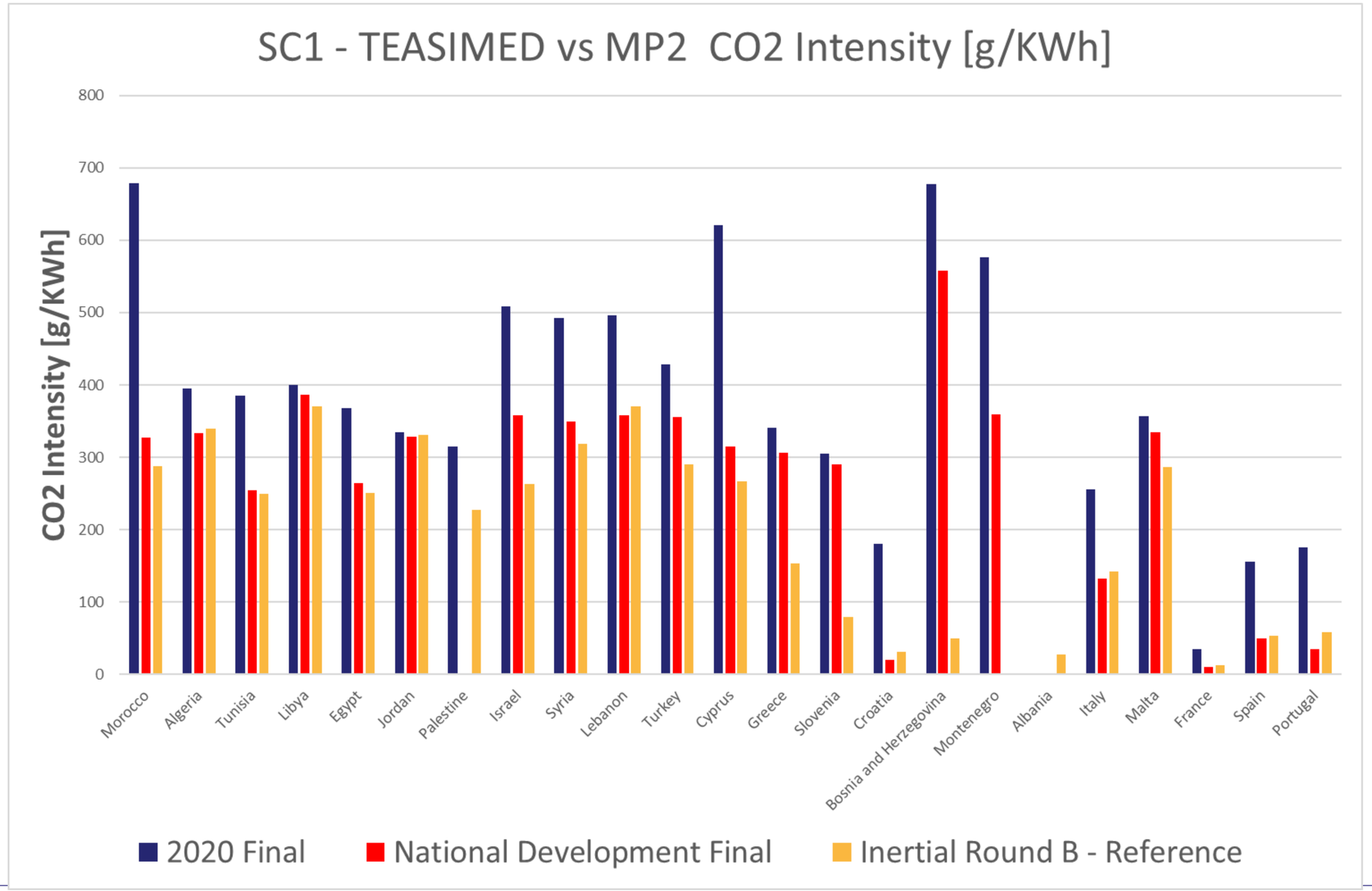


TEASIMED Scenarios – CO_2



2020 Master Plan outcomes

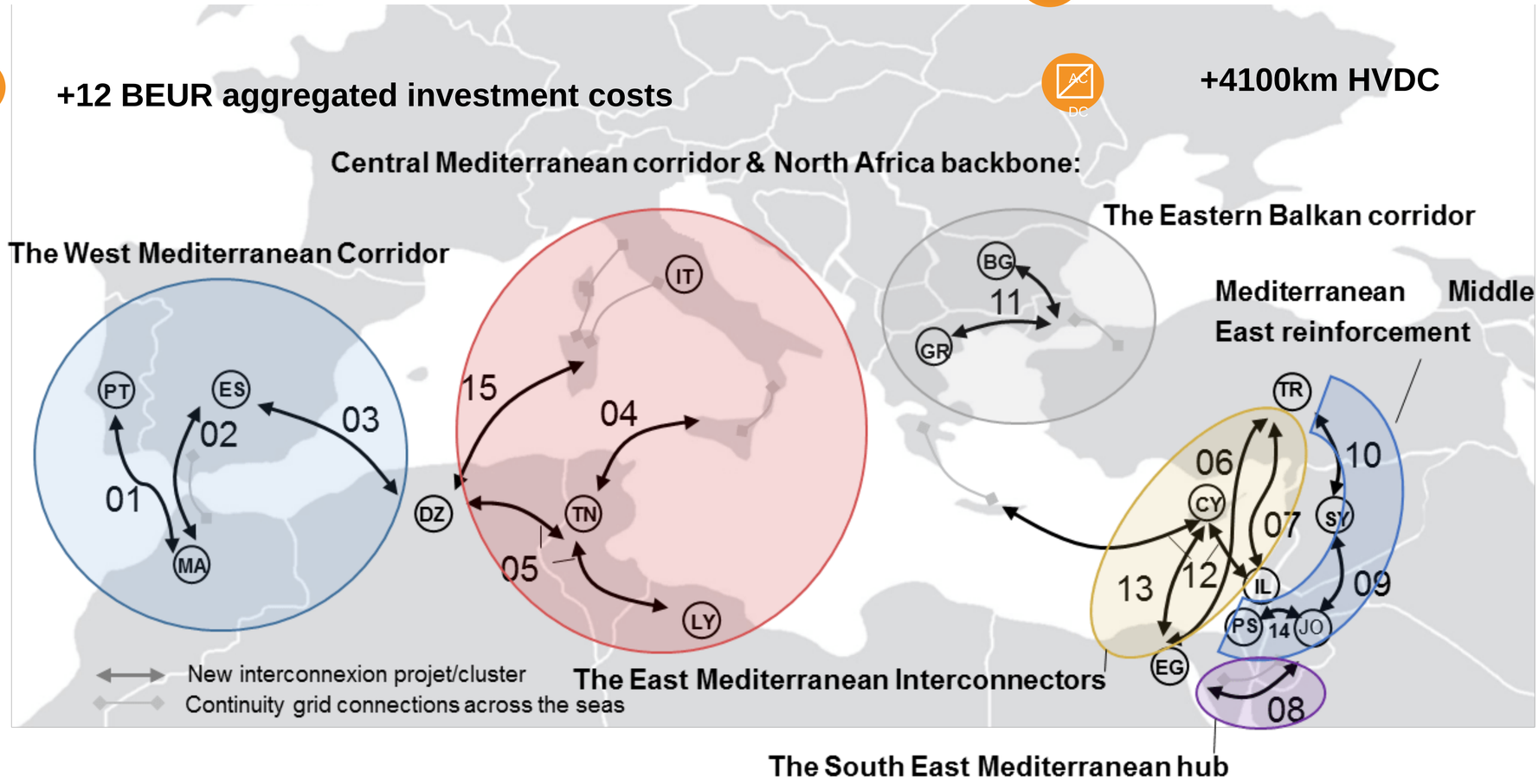
15 projects for 5800 km of additional lines

+18 GW capacity

+12 BEUR aggregated investment costs

+4100km HVDC

1. Selection of projects
2. Market and network studies
3. Cost-Benefit Analysis



https://masterplan.med-tso.com
https://data.med-tso.com

Mediterranean Masterplan 2022 – list of projects

• Project 1 – Morocco (MA00) – Portugal (PT00)
• Project 2 – Morocco (MA00) – Spain (ES00)
• Project 3 – Algeria (DZ00) – Spain (ES00)
• Project 4 – Italy (ITSI) – Tunisia (TN00)
• Project 5 – Algeria (DZ00) – Tunisia (TN00)
• Project 6 – Egypt (EG00) – Turkey (TR00)
• Project 7 – Israel (IL00) – Turkey (TR00)
• Project 8 – Egypt (EG00) – Jordan (JO00)
• Project 9 – Jordan (JO00) – Syria (SY00)
• Project 10 – Syria (SY00) – Turkey (TR00)
• Project 11 – Bulgaria (BG00) – Greece (GR00) – Turkey (TR00)
• Project 12 – Greece (GR03) – Cyprus (CY00) – Israel (IL00)
• Project 13 – Cyprus (CY00) – Egypt (EG00) – with 12
• Project 14 – Jordan (JO00) – Palestine (PS00)
• Project 15 – Algeria (DZ00) – Italy Sardinia (ITSA)
• Project 16 – Egypt – Greece
• Project 17 – Italy – Greece
• Project 18 – Egypt – Libya
• Project 19 – Algeria – Libya

ELMED Project

- ELMED is a **strategic project complying with** EU priorities and fulfilling EU Green Deal requirements:
  - enable a further **diversification of energy sources** between Europe and MENA countries
  - enable the **EU market integration** (through Italy) **with North Africa**
  - facilitate the **integration of RES** on both the two shores of the Mediterranean
  - allow reducing adequacy problems, to **improve Security of Supply and sustainability**
  - contribute to **create a Euro-Mediterranean Grid**
  - contribute to reach **short-, medium- and long-term EU climate and energy targets for both EU and non-EU countries**
- Ongoing/concluded activities**:**
  - **Public consultation completed in Italy in July 2021**
  - **Stakeholder consultation ongoing in Tunisia** within the frame of the Environmental-Social Impact Assessment (ESIA)
  - **World Bank** contributed to **finance Pre-FEED & FEED studies** (12.5 MUSD), compl. by 31.12.22
- **ELMED needs EU financing support to be realized**

Cluster 4 – Italy Tunisia MMP2020 - Generals

On 8 December the European Commission announced the approval of a grant of about 307 million euros for the implementation of ELMED, the underwater interconnection project between Italy and Tunisia, strongly promoted by our members Terna SpA and Société Tunisienne de l'Electricité et du Gaz (STEG).

The 230 km submarine cable will connect the substations of Partanna, in Sicily and Hawaria, in Tunisia, with a capacity of 600 MW and it is expected to be completed by 2027. Its total cost should amount to 850 million euros.

The approval of this project, included in MedTSO Masterplan of Interconnections since its first edition in 2018, marks an historical step towards the creation of the Mediterranean electricity markets through the integration of the grids of the north and south shores of the Mediterranean and it will be fundamental to strengthening the energy security of the region and increase electricity production from renewable sources.

A detailed description of the project can be found in Med-TSO’s “Mediterranean Project 2” Masterplan

The ELMED Interconnector

- First link North - South in the central corridor of Mediterranean
- Expected to be completed by 2027
- Promoted by Terna and STEG
- Recognized as PCI since the 3rd list and in the Ten-Year Network Development Plan of ENTSO-E
- Part of the reference grid considered as base case of Med-TSO studies for all the other assessed projects
- Project analysed with a TOOT *(Take one out at the time)* methodology in the Master Plan 2020

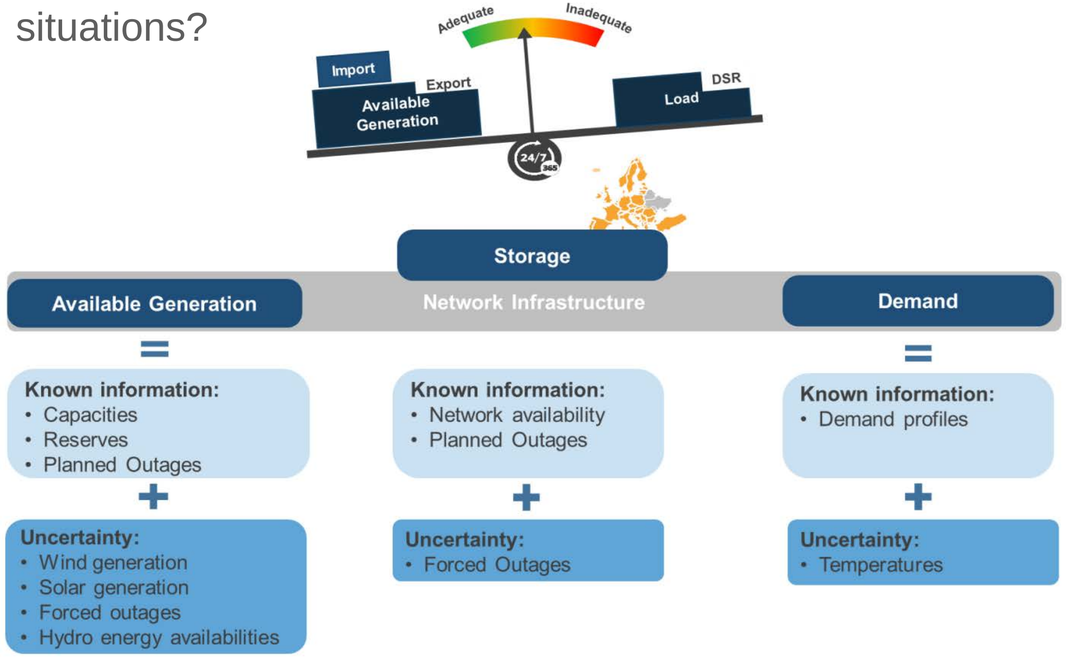
The ELMED Interconnector

Undersea HVDC interconnection between the existing electrical substation in Partanna (TP) on the Italian side and a newly built substation in Menzel Temime (Mlaaba, Cap Bon Peninsula) on the Tunisian side

- **Main characteristics**
  - o Rated Power: 600 MW
  - o Technology: HVDC
  - o Maximum depth: around 800 m
  - o Cables length: 200 km undersea cable; 28/34 km land cables
  - o Construction period: 4 years
  - o Commissioning: 2027
  - o In TERNA's Network Development Plan since 2017
  - o In the Tunisian National Development Plan since 2016

Coordinated Adequacy assessments

- Coordinated adequacy assessment to help answering Security of Supply questions like:
  - Does the country ‘A’ have enough capacity to cover power demand even under severe/extreme conditions?
  - How the interconnection could reduce shortage situations?



What’s needed to implement target methodology for Adequacy studies?

1. DATA:
   a. **TSO input**
   b. Synthetic climate data
2. SOFTWARE

antares simulator

PSR

PLEXOS BY ENERGY EXEMPLAR

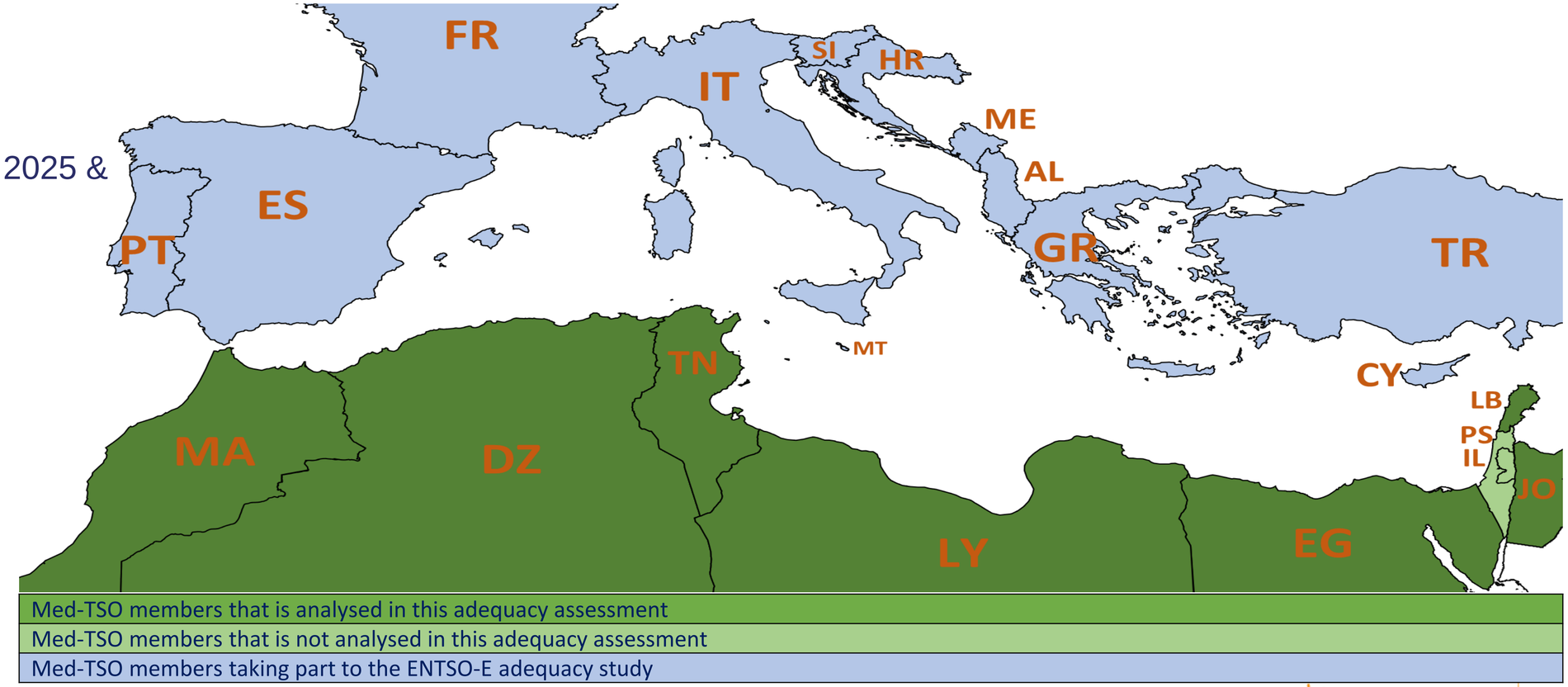
BID3 Electricity Market Model

3. TRAINED ANALYSTS

Adequacy assessment methodology

The latest development of the EU regulations and decisions put additional responsibilities on European TSOs in the process of assessing and controlling system adequacy. With the aim to follow the same development, Med-TSO decided to carry out similar investigations related to power system's adequacy for the non-EU Med-TSO members

- The Summer Outlook 2022
- **Winter Outlook 2022/2023**
- Early Summer Outlook 2023
- Mid-term Adequacy Forecast 2025 & 2027



Adequacy indicators and other results of adequacy assessment

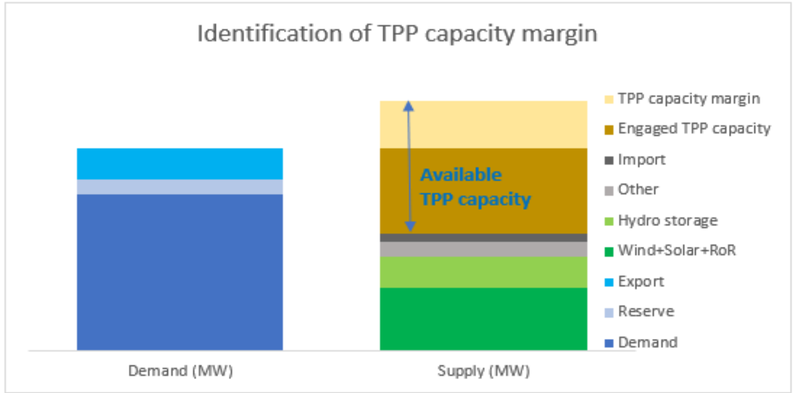
Loss of Load Expectation (LOLE) in a given geographical zone for a given period (year, season) is the **expected** number of hours when there is a lack of resources to cover the demand needs, within a sufficient transmission grid operational security limit.

Expected Energy Not Served (EENS) in a given geographical zone for a given period (year, season) is the **expected** value of energy not to be supplied due to lack of resources while complying with transmission grid operational security limit.

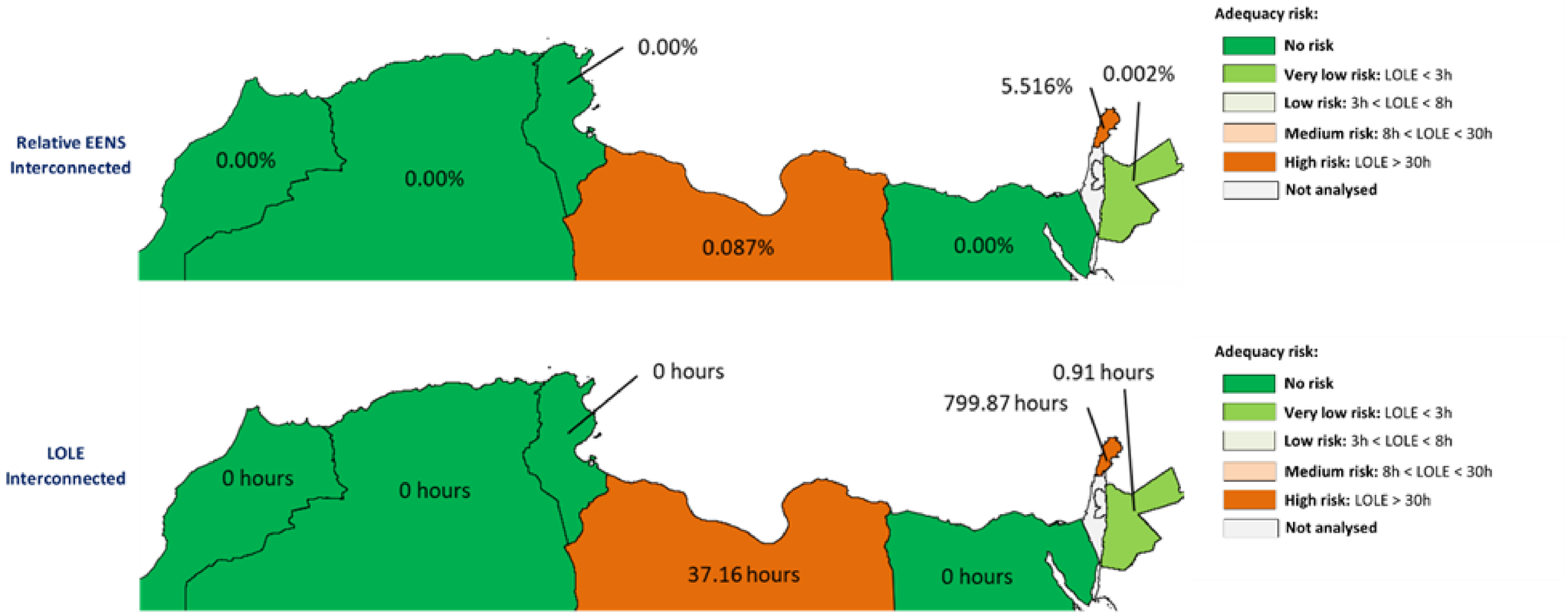
Relative EENS: is a more suitable indicator to compare adequacy across geographical scope as it represents the percentage of annual (seasonal) demand which is expected to be not supplied.

Dump Energy: or RES curtailment, in a given geographical zone for a given period, is the energy generated in excess that cannot be balanced, for instance when the load is low and the in-feed of renewables is high.

The Capacity Margin for a given geographical zone for a given point in time is the difference between the available capacity and the demand.

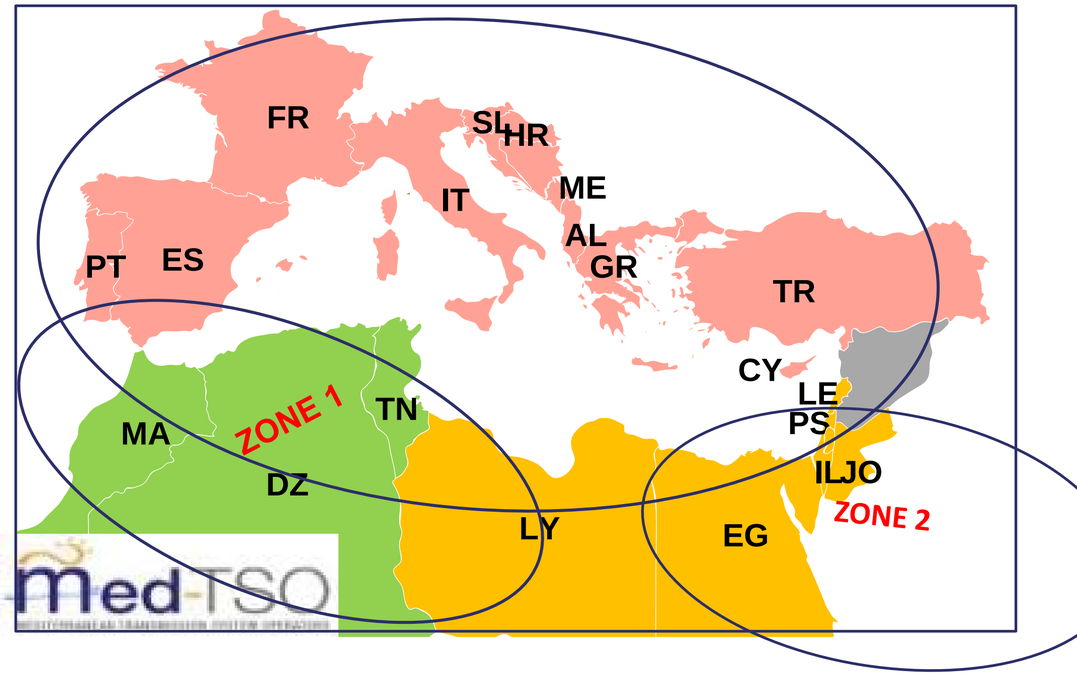


Winter Outlook 2022/2023 Adequacy assessment – Main indicators overview – interconnected operation



Creating an Interconnected Electricity Exchange Zone (IEEZ) - Launching pilot projects

- Roadmaps set up by Med-TSO with the final goal to promote the efficient operation of interconnected electrical systems, through the use of trading web platforms
- Implement a coherent and harmonized set of technical rules for the management of existing interconnections
- Start the preparation of coordinated national plans for the development of HV networks



- Joint Cooperation Agreement signed in Algiers on 22.11.2022 among COMELEC, MEDENER, Med-TSO and OME, envisaged extension to MedReg
- **A win-win integration with the EU energy market**

Protocole d'Algér

Joint Cooperation Agreement signed in Algiers on 22.11.2022 among COMELEC, MEDENER, Med-TSO and OME

Envisaged extension to MedReg after the Assembly of 1 December

Non-technical barriers to regional integration: institutional

Institutional Partnerships

Supporting Med-TSO work programme since 2015

Med-TSO active stakeholder in *REM Platform*

Cooperation framework since 2014

Long-term joint cooperation agreement since 2017

Cooperation within UfM Energy Platforms

Cooperation within UfM energy platforms and strengthened collaboration for the development of long-term energy scenarios

- **Gradual approach**
- **No one-size-fits-all solutions**
- **Sub-regional approach**

4th EC grant (2023-2025): TEASIMED 2

- Main outcomes confirmed (Masterplan, Grid Code, Pilot Projects, Knowledge Sharing, Adequacy)
- Wider perimeter of activities:
  - Long term scenarios (2040-50)
  - Cybersecurity issues and resilience of integrated power systems
  - Offshore potential assessment
  - Storage and other flexibility means
  - Possible cooperation in Research, Development & Innovation

THANK YOU!

INFO@MED-TSO.COM

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