Med-TSO
MEDITERRANEAN TRANSMISSION SYSTEM OPERATORS

# Deliverable 5.1.1

# DESIGN AND IMPLEMENTATION OF A SECTION OF THE EXTRANET AREA DEDICATED TO OPERATIONAL DATA AND REPORTS

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# Deliverable 5.1.2

# PROCEDURE FOR COLLECTION, MERGE AND REPORT OF OPERATIONAL DATA

## EC DGNEAR - GRANT CONTRACT: ENI/2018/397-494

## "Med-TSO—Mediterranean Project II"

## Task 5.1 "Common Web-Platform for TSOs members to gather information on cross-border interconnections "

Med-TSO is supported by the European Union.
This publication was produced with the financial support of the European Union. Its contents are the sole responsibility of Med-TSO and do not necessarily reflect the views of the European Union.

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# I. Introduction

This document constitutes the report on Activity 5.1, one of the activities assigned to the committee TC3 "International Electricity Exchanges" in the framework of the Mediterranean Project 2, a two years project granted by the European Commission during 2018. This activity consists of two tasks:

The first task (Task 5.1.1) describes the Terms of Reference for the implementation of a common Web Platform for TSOs members of Med-TSO to be published on Med-TSO website, to gather information/data on cross-border interconnections. This includes, inter alia, the technical specification of the web platform in what concerns its layout and its contents, the information that it is designed to gather and the data refresh frequency. As for the second task (Task 5.1.2), it describes the procedures for operational data collection and reporting.

The implementation of the web platform will be performed under the supervision of Med-TSO and in close collaboration with relevant team members of TC3 committee.

**The work to be performed consists of re-using the full functionalities currently implemented for the Med-TSO web-platform and subsequently proceed with necessary adaptations in order to allow:**

- Importing/exporting excel files containing relevant basic information and performance indicators related to Med-TSO Members.
- Processing and validating the excel files. In case of any incompatibility due to format, the system will inform the users with clear messages describing the errors;
- Combining all excel files, gathering data and generating relevant forms, tables and graphics for Med-TSO Members.

### Future developments

The future developments consist of re-using the full functionalities currently implemented for the Med-TSO database (Network and Adequacy) and for the associated web application services, and to proceed with the necessary adaptations in order to enable the implementation of the above-described features.

Additionally, the future work should eliminate redundancy and facilitate seamless integration with the existing database, models and web applications.

# II. Terms of reference for the implementation of the web Platform (Task 5.1.1)

## II.1. The data to display in the platform

### a) Short term

First data collection to be held in 2020, consisting of 2019 year-end data, subsequently updated on an annual basis:

- ✓ Map of the transmission network of the national electrical system, which is already shared.
- ✓ Installed capacity data by technology on the national electrical system as of December 31st of the previous year. This will be provided at the beginning of each year.
- ✓ Historical load demand data. To be provided at the beginning of each year with the annual demand in the national electrical system.
- ✓ Historical generation data. To be provided at the beginning of each year with annual generation data by technology in the national electrical system.
- ✓ Historical data on international exchanges, consisting of the sum of imports, the sum of exports and the balance in each interconnection (border). To be provided at the beginning of each year with annual exchanges.
- ✓ General characteristics of the transmission grid, namely the length of transmission lines per voltage level and the transformation capacity per primary and secondary transformer voltage levels.
- ✓ In the first phase, at least 28 Key Performance Indicators.

### b) Medium term

In the medium-term, it is envisaged to increase the frequency of updates of some of the 7 bullet points mentioned above from yearly to monthly. In addition, the following data should also be published on the Med-TSO website:

- ✓ Real-time generation data by technology. The timestamp must be defined by mutual agreement.
- ✓ Real-time load demand data.
- ✓ The total hourly generation forecast. Data for D-Day must be provided the day before (D-1).
- ✓ The hourly load demand forecast. Data for D-Day must be provided the day before (D-1).
- ✓ Hourly forecasts for wind and solar generation. Data for D-day must be provided the day before (D-1).
- ✓ The planned hourly capacity for each interconnection must be provided according to 3 calendars: annually, monthly and daily.

For some of this data IT development is required (or at least recommended for efficiency reasons). Additionally, in some cases, the availability of data should be discussed with TSOs.

### c) Long term

In the long-term the following additional data should also be published in the Web platform:

- ✓ Day-ahead and intraday market prices. To be provided each hour H for the previous hour (H-1).

- ✓ Statistic data on daily and intraday market prices. To be provided each month (M) with data from the previous month (M-1).

## II.2. Utility of the platform for the member countries

The platform will enable the various operators in the electricity sector to:

- ✓ Access to information quickly;
- ✓ Access information on the performance of each system;
- ✓ Access information on the performance of interconnected networks;
- ✓ Access information on the performance of interconnections;
- ✓ Illustrate the opportunity of complementarity.

## II.3. Description of the platform

### a) Interface

The web platform interface should include the map of the countries of the Mediterranean basin, including their electricity transmission grid interconnections, as well as different buttons pointing to different data. The platform will be available in two languages: French and English.

#### a-1) Short term:

In the first phase, the interface will include, on the vertical axis, static data concerning: the generation; the electrical network; the exchanges on the interconnections; the key performance indicators; and the consumption. The horizontal axis will include the buttons of the Med-TSO member countries, as well as the projects of the Med-TSO association under consideration in the frame of MPII, the different technical committees and the regulations of the different member countries as shown in Figure 1. All the information detailed subsequently will be updated on an annual basis.

For the generation, the following information will be displayed:

- ✓ Historical data on installed power by technology;
- ✓ Historical data on produced energy by technology.

For the data of the electrical network, the following information will be displayed:

- ✓ Historical data on the network length per voltage level;
- ✓ Historical data on the transformation capacity per voltage level (primary and secondary);
- ✓ Transmission grid maps in PDF format.

For consumption data, the following information will be displayed:

- ✓ Historical data on the national demand;
- ✓ Historical data on annual peak loads with their date;

- ✓ Historical data on the annual off-peak loads with their date.

For the interconnections data, the following information will be displayed:

- ✓ The utilization rates of the interconnection;
- ✓ The annual, sum of imports, sum of exports and balance per interconnection border.
- ✓ The interconnection technology
- ✓ The voltage level

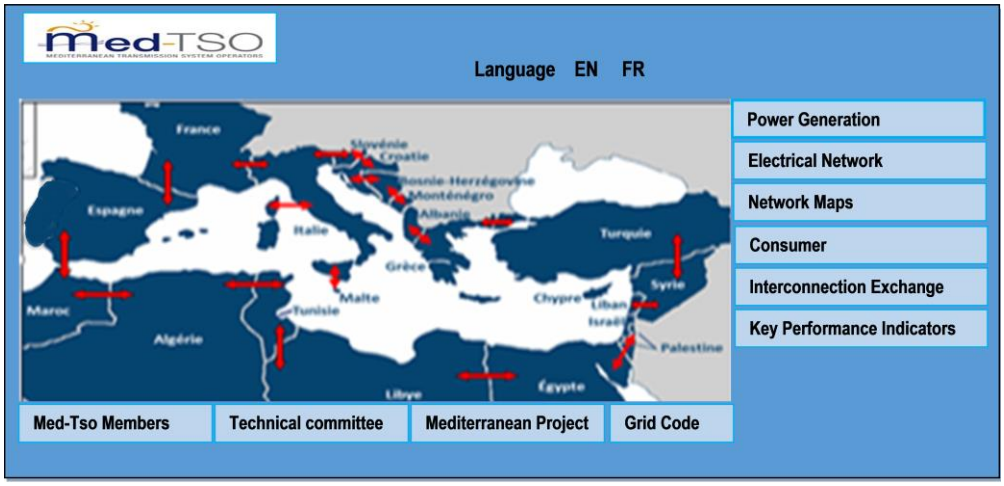
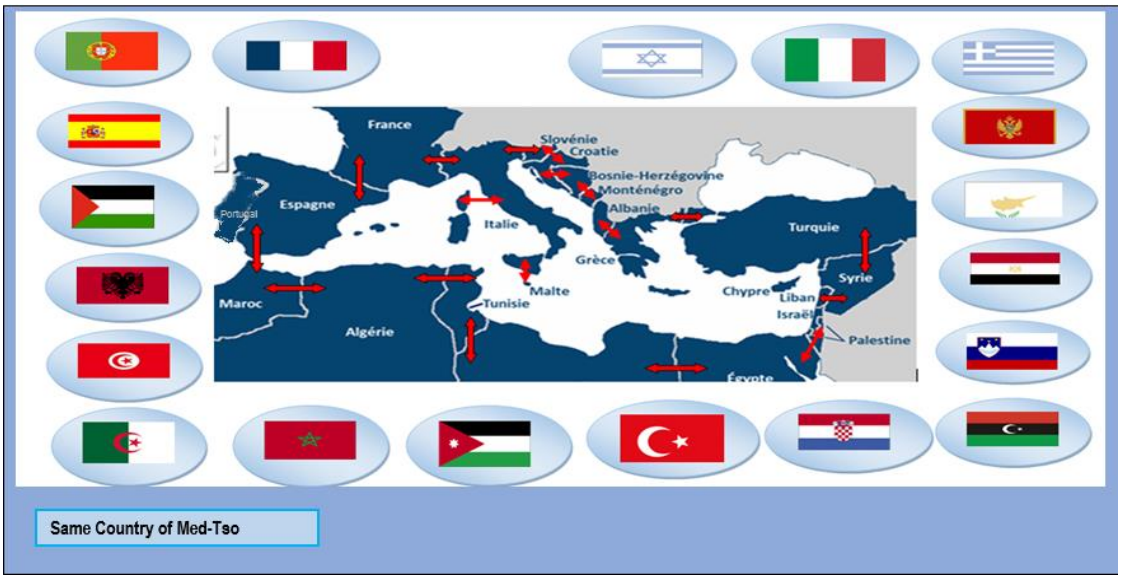



*Figure 1: Suggested Med-TSO platform interface in the short term*

### ❖ On the Horizontal Axis




- ✓ By clicking on the **Technical committee** button, the information on all the work assigned to the various committees of the Med-TSO will be displayed, showing the work streams of the project presently under development (e.g. the Mediterranean Project 2).

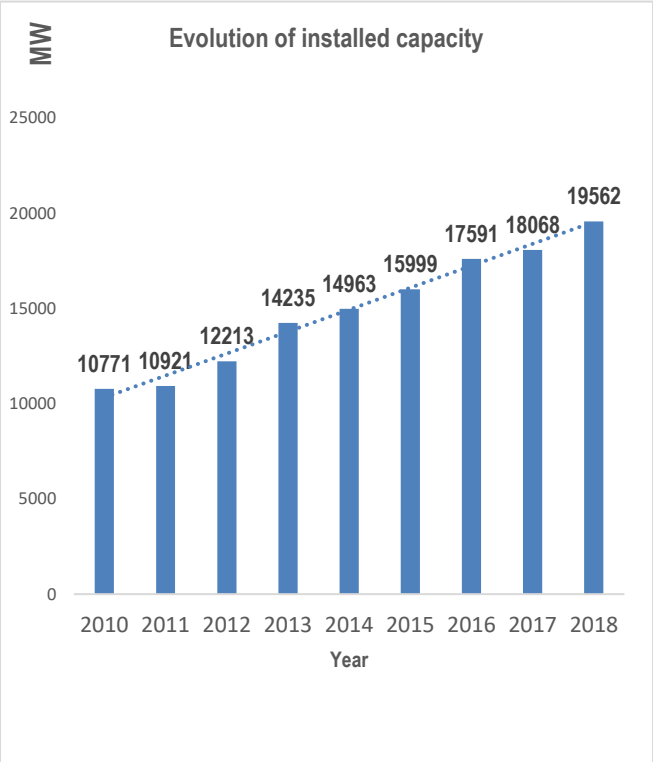
- ✓ By clicking on the button **Mediterranean Project**, the user should access the roadmap that has been elaborated, followed by the different meetings held to reach the deliverables of the committees.
- ✓ By clicking on the **Grid code** button, the information on the legislation of the electricity sector of the member countries will be accessible through links to Members website;

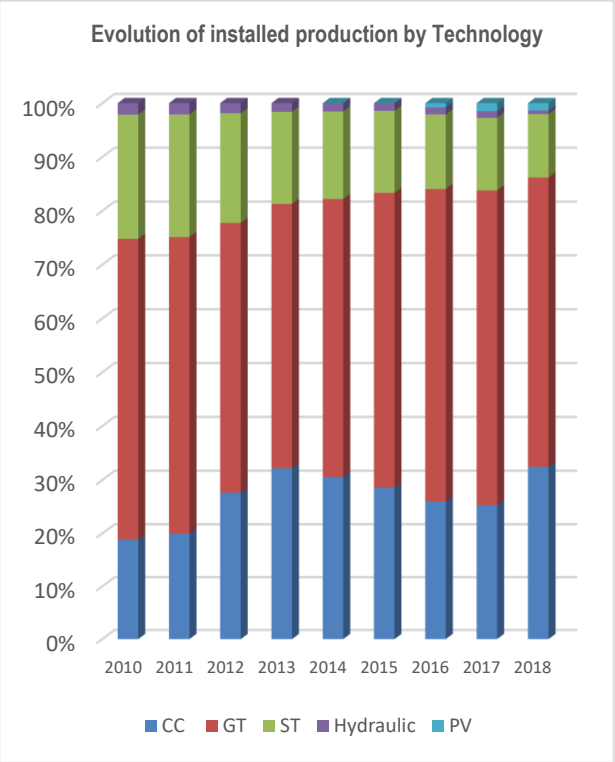
### ❖ On the vertical axis

- ✓ By clicking on the Power Generation button, a screenshot similar to the following will be displayed:


By clicking on the button "Installed production capacity" and "Produced Energy" the user will have access to the historical data of the installed capacity and the annual generation according to the template attached to this file in Excel format, which will be filled in by the representatives of each member country of the Med-TSO Association.
Additionally, there will be available graphs showing the evolution of installed capacity and annual generation by technology for each member country, as well as the total installed capacity and the total generation for the whole Med-TSO association.

**Example:**



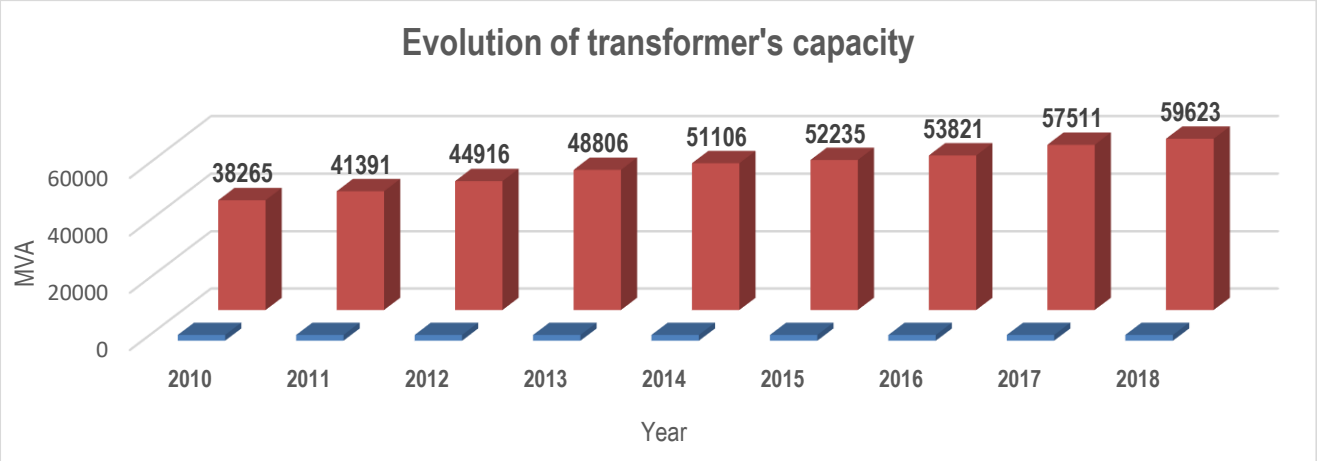

✓ For the **Electrical Network** button

By clicking on the **Electrical Network** button**,** the user will have access to information about the network length by voltage level, as well as the transformation capacities of the electrical grid of each member country with a consolidation of the total (length and transformation capacity) for Med-TSO, according to the template in Excel which will be filled out by the representatives of the member countries

By clicking on this button, the following window will be displayed:

By clicking on the button Transmission line or Transformers' capacity, the statistical data on the network length and the transformation capacity of each network will be displayed. Presentation of these data can be done in tabular form.

**Example of data display:**




## Total transformers' capacity

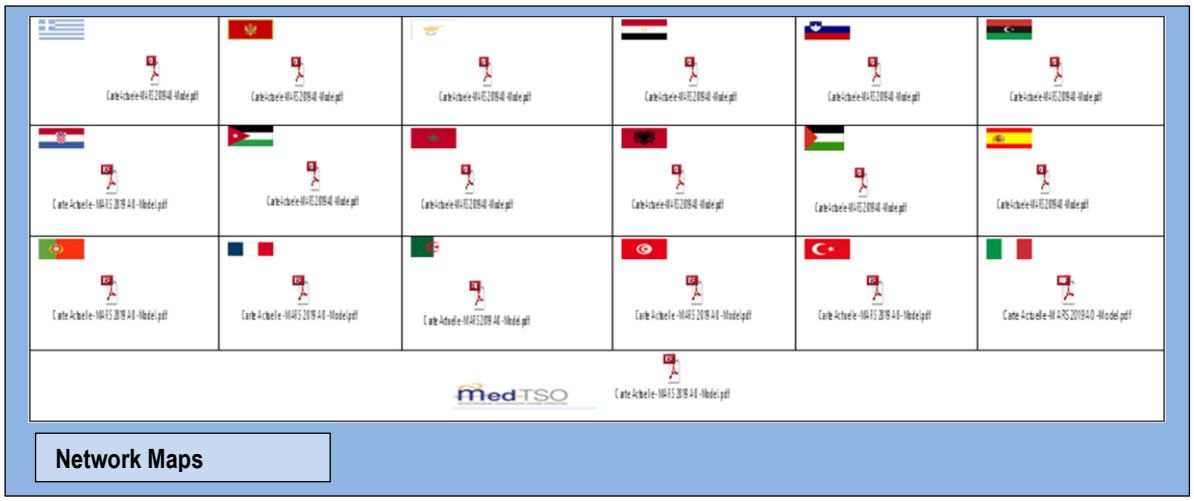
| | | | | | |
|---|---|---|---|---|---|
| *Data collection Date: 31-12-2019* | | | | | |
| Country | France | | | | |
| Year From | 2016 | | | | |
| Year To | 2018 | | | | |

| Total transformers' capacity | | | | |
|---|---|---|---|---|
| Date | 31.12.2019 | 31.12.2018 | 31.12.2017 | 31.12.2016 |
| Transformers | Value in MVA | Value in MVA | Value in MVA | Value in MVA |
| **Total capacity of transformers with primary winding at 400 kV** | | | | |
| Of which transformers with secondary winding at 220 kV | | | | |
| Of which transformers with secondary winding at 150 kV | | | | |
| Of which transformers with secondary winding at 132 kV | | | | |
| Of which transformers with secondary winding at 90 kV | | | | |
| Of which transformers with secondary winding at 60 kV | | | | |
| **Total capacity of transformers with primary winding at 220 kV** | | | | |
| Of which transformers with secondary winding at 150 kV | | | | |
| Of which transformers with secondary winding at 132 kV | | | | |
| Of which transformers with secondary winding at 90 kV | | | | |
| Of which transformers with secondary winding at 60 kV | | | | |
| **Total capacity of transformers with primary winding at 150 kV** | | | | |
| Of which transformers with secondary winding at 132 kV | | | | |
| Of which transformers with secondary winding at 90 kV | | | | |
| Of which transformers with secondary winding at 60 kV | | | | |
| **Total capacity of transformers with primary winding at 132 kV** | | | | |
| Of which transformers with secondary winding at 90 kV | | | | |
| Of which transformers with secondary winding at 60 kV | | | | |
| **Total capacity of 90/60 kV transformers** | | | | |
| | | | | |
| **Total transformers' capacity** | | | | |

- ✓ For the **Network Maps** button:

By clicking on the box **Network Maps,** the user will have access to the network maps of the member countries of Med-TSO. These maps will be introduced in the platform in PDF format.

**Examples:**

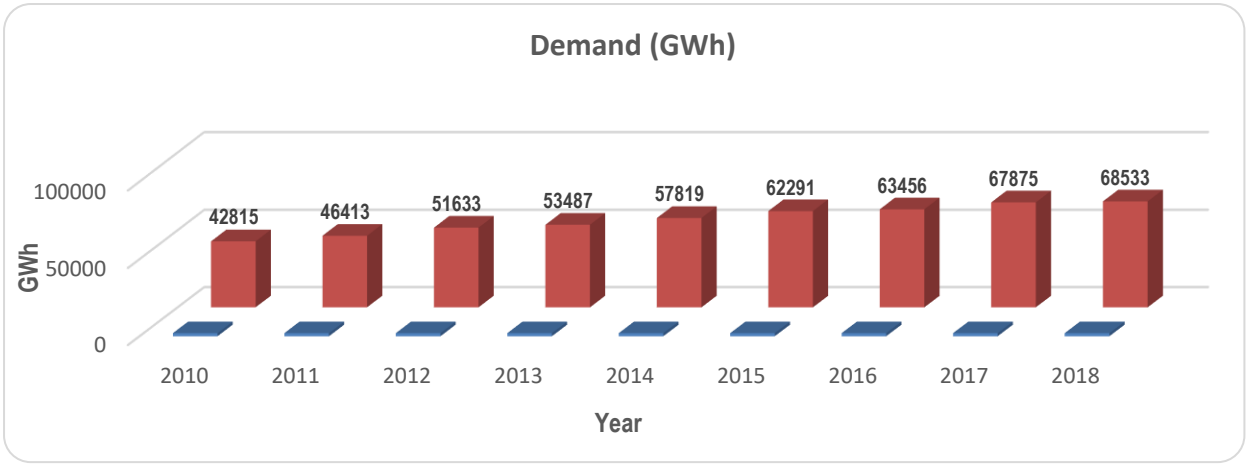



✓ For The **Consumers** button:

By clicking on the button **Consumer**, the following window will be displayed:


By clicking on the **Demand** button, historical data on the national consumption will be displayed, and by clicking on the **Highest Load & Lowest Load** buttons, the annual peak and off-peak demand of each country will be displayed.
This information can be displayed in the form of tables and graphs to see the evolution. Data will be filled out annually in Excel tables by the representatives of the member countries of Med-TSO.

**Example:**




- ✓ For The **Interconnection Exchange** button:

By clicking on the **Interconnection Exchange** button, historical data on physical flows on all international links of Med-TSO member countries will be displayed. Such data will be displayed on tables that will be filled out by the representatives of the member countries.

- ✓ For The **Key performance indicators** button:

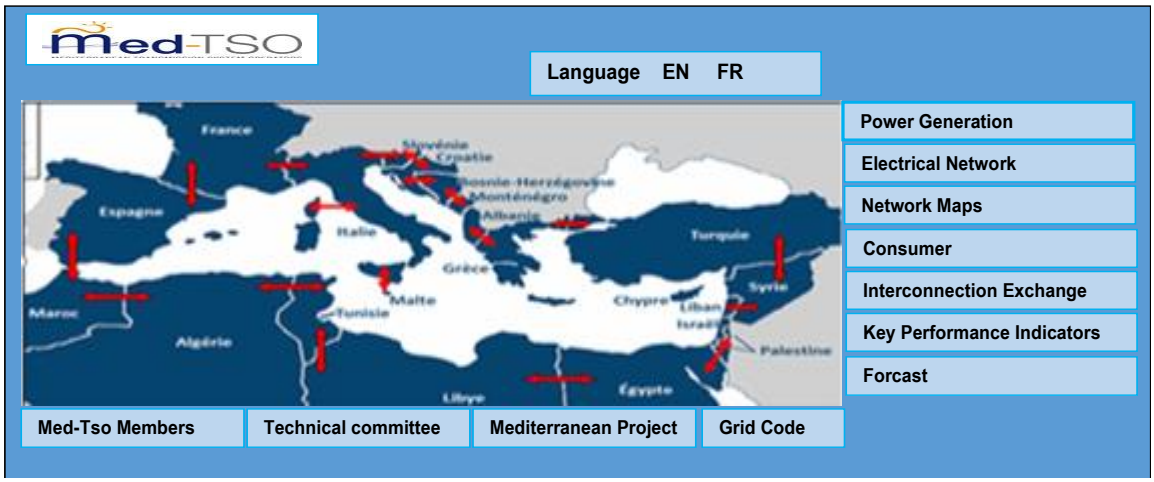
Concerning the key performance indicators of the electrical networks of the member countries of the Med-TSO association, they will be accessible by clicking on the button **Key performance indicators.** These indicators will be defined in the deliverable of the activities 5.2 of the TC3 and will be displayed in the form of tables and historical graphs.

### a-2) Medium term:

In the medium term, the main interface of the Med-TSO platform will be completed on the vertical axis by the additional following information:

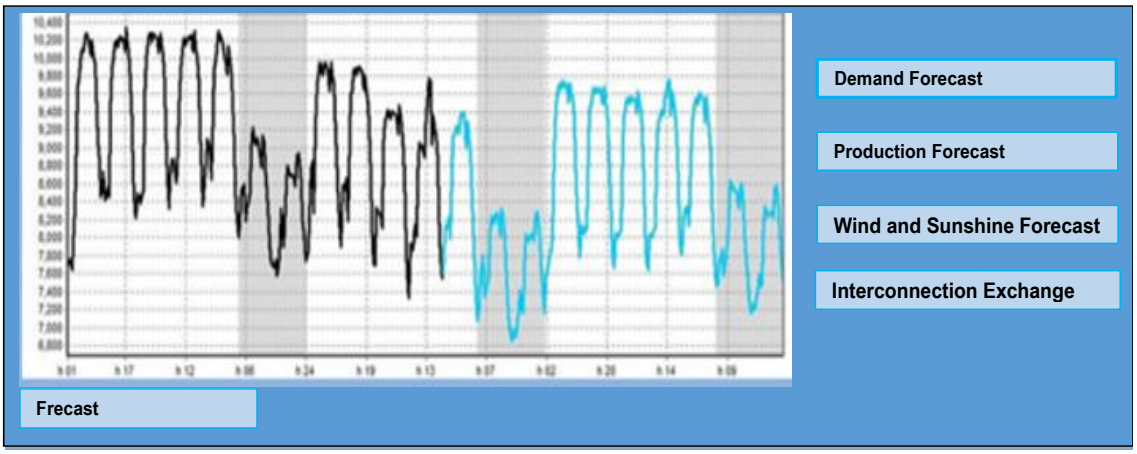
- ✓ Real time generation and demand data;
- ✓ Demand and generation forecasts (D + 1)
- ✓ Hourly forecasts for wind and sun (D + 1)
- ✓ Planned hourly capacity for each interconnection, to be provided according to 3 calendars: annual, monthly and daily

The real-time generation data will be accessible through the **Power Generation** button, as shown in the figure below:




- ✓ By clicking on the button **Real time production** the user can find the values of the production in service by type of technology, as well as the generation curve from 00h00 to 24h00 of each member country of Med-TSO. The data will be displayed up to for the hour (H-1).

The forecast component will be accessible through the **Forecast** button. The data accessed through this button will include the forecasts of the demand and the generation, as well as forecasts for wind and solar generation, as shown in the figure below:




- ✓ By clicking on the **Demand forecast** button, the user will have access to the forecasts of the hourly demand for the day (d+1) which will be displayed in table and graph form.
- ✓ By clicking on the button **Production forecast**, the user will have access to the forecasts of the hourly production for the day (d+1) which will be displayed in the form of table and graphs.
- ✓ By clicking on the button **Wind and solar generation forecast**, the user will have access to the hourly forecasts of the wind and the sunshine for the day (d + 1) with the equivalent RES production which will be displayed in the form of table and graphs.
- ✓ By clicking on the **Exchange interconnection** button, the user will have access to the forecasts of the physical flows on the interconnections for the days (D + 1), as well as their utilization rates which will be displayed in the form of tables and graphs.

### a-3) Long term:

In the long term, the main interface of the Med-TSO platform will be completed with information on the different electricity markets of which the member countries of Med-TSO are part of, as shown in the figure below:

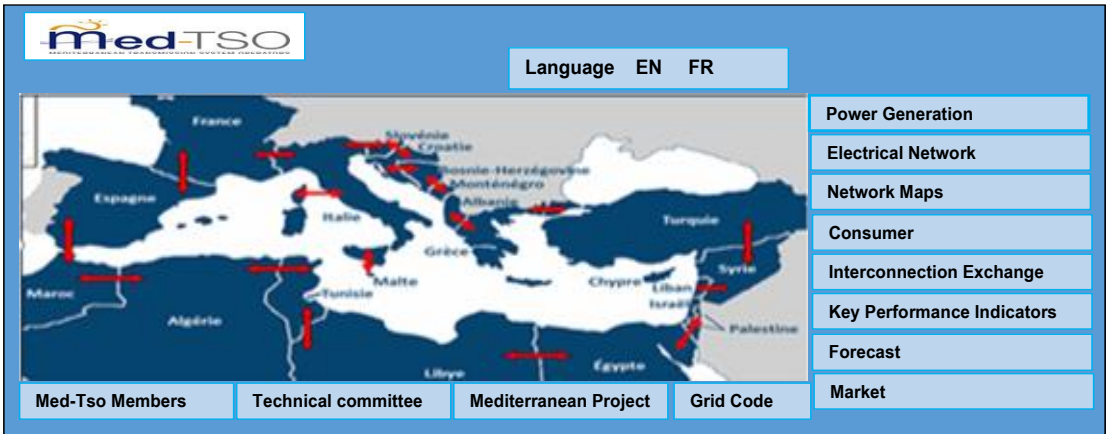



*Figure 3: Med-TSO platform interface in the long term*

By clicking the **Market** button, different prices of the daily and intraday markets on which the member countries of the Med-TSO association participate will be presented. The data will be displayed with an hourly detail in the form of tables. Additionally, statistical data on the prices of the markets monthly will also be available.

## III. Procedures for operational data collection and reporting (Task 5.1.2)

Data collection will be based on importing/exporting excel files containing relevant basic information and performance indicators related to Med-TSO Members. An Excel file template that contains the type of data has already been prepared and adopted and shall be implemented by the Consultant (see the figures below):

***Data collection Date: 07-08-2019***

| | |
|---|---|
| Country | France |
| Year From | 2016 |
| Year To | 2018 |

| Installed Generation Capacity Aggregated | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | | 31.12.2019 | 31.12.2018 | 31.12.2017 | 31.12.2016 | | |
| **Category** | | Value in MW | Value in MW | Value in MW | Value in MW | | Comment |
| **Nuclear** | | | | | | | |
| **Fossil fuels** | | | | | | | |
| | Of which Fossil Brown coal/Lignite | | | | | | |
| | Of which Fossil Hard coal | | | | | | |
| | Of which Fossil Coal-derived gas | | | | | | |
| | Of which Fossil Gas | | | | | | |
| | | *Of which Combined Cycle* | | | | | |
| | | *Of which Gas Turbine (open cycle)* | | | | | |
| | | *Of which Combined Heat and Power (CHP)* | | | | | |
| | | *Of which Steam and others* | | | | | |
| | | *Of which Gas/Solar Thermal Combined Cycle (primary energy is mainly gas with a supplement with Solar Thermal)* | | | | | |
| | Of which Fossil Oil | | | | | | |
| | | *Of which Diesel Motor (light oil)* | | | | | |
| | | *Of which Oil Turbine* | | | | | |
| | | *Of which Combined Heat and Power (CHP)* | | | | | |
| | | *Of which Steam and others* | | | | | |
| | Of which Fossil Oil shale | | | | | | |
| | Of which Fossil Peat | | | | | | |
| | Of which Mixed fuels | | | | | | |
| | Of which Other fossil fuels | | | | | | |
| **Wind** | | | | | | | |
| | Of which Wind offshore | | | | | | |
| | Of which Wind onshore | | | | | | |
| **Solar** | | | | | | | |
| | Of which Solar PV | | | | | | |
| | Of which Solar Thermal | | | | | | |
| | Of which Solar Thermal/Gas Combined Cycle (primary energy is mainly Solar Thermal with a supplement with gas) | | | | | | |
| **Non fossil fuel** | | | | | | | |
| | Of which Biomass | | | | | | |
| | Of which Biogas | | | | | | |
| | Of which Waste | | | | | | |
| | | *Of which renewable part* | | | | | |
| | | *Of which non renewable part* | | | | | |
| **Geothermal** | | | | | | | |
| **Hydro** | | | | | | | |
| | Of which Hydro Pure storage (reservoir) | | | | | | |
| | Of which Hydro Run-of-river and pondage | | | | | | |
| | Of which Hydro mixed pumped storage (renewable part) | | | | | | |
| | Of which Hydro mixed pumped storage (non renewable part) | | | | | | |
| | Of which hydro pure pumped storage (non renewable) | | | | | | |
| | Of which Hydro Marine (tidal/wave) | | | | | | |
| **Other renewable (not listed)** | | | | | | | |
| **Other non-renewable** | | | | | | | |
| **Non identified (other not listed)** | | | | | | | |
| **Total NGC** | | | | | | | |
| Comments | | | | | | | |
| **Percentage of Solar PV connected to the grid operated by the TSO** | | | | | | | |
| **Percentage of Wind connected to the grid operated by the TSO** | | | | | | | |

*Excel file template for collecting installed capacity data*

***Data collection Date: 07-08-2019***

| | |
|---|---|
| Country | France |
| Year From | 2016 |
| Year To | 2018 |

| Net Annual Generation Aggregated | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | | 2019 | 2018 | 2017 | 2016 | | |
| **Category** | | Value in TWh | Value in TWh | Value in TWh | Value in TWh | | Comment |
| **Nuclear** | | | | | | | |
| **Fossil fuels** | | | | | | | |
| | Of which Fossil Brown coal/Lignite | | | | | | |
| | Of which Fossil Hard coal | | | | | | |
| | Of which Fossil Coal-derived gas | | | | | | |
| | Of which Fossil Gas | | | | | | |
| | | *Of which Combined Cycle* | | | | | |
| | | *Of which Gas Turbine (open cycle)* | | | | | |
| | | *Of which Combined Heat and Power (CHP)* | | | | | |
| | | *Of which Steam and others* | | | | | |
| | | *Of which Gas/Solar Thermal Combined Cycle (primary energy is mainly gas with a supplement with Solar Thermal)* | | | | | |
| | Of which Fossil Oil | | | | | | |
| | | *Of which Diesel Motor (light oil)* | | | | | |
| | | *Of which Oil Turbine* | | | | | |
| | | *Of which Combined Heat and Power (CHP)* | | | | | |
| | | *Of which Steam and others* | | | | | |
| | Of which Fossil Oil shale | | | | | | |
| | Of which Fossil Peat | | | | | | |
| | Of which Mixed fuels | | | | | | |
| | Of which Other fossil fuels | | | | | | |
| **Wind** | | | | | | | |
| | Of which Wind offshore | | | | | | |
| | Of which Wind onshore | | | | | | |
| **Solar** | | | | | | | |
| | Of which Solar PV | | | | | | |
| | Of which Solar Thermal | | | | | | |
| | Of which Solar Thermal/Gas Combined Cycle (primary energy is mainly Solar Thermal with a supplement with gas) | | | | | | |
| **Non fossil fuel** | | | | | | | |
| | Of which Biomass | | | | | | |
| | Of which Biogas | | | | | | |
| | Of which Waste | | | | | | |
| | | *Of which renewable part* | | | | | |
| | | *Of which non renewable part* | | | | | |
| **Geothermal** | | | | | | | |
| **Hydro** | | | | | | | |
| | Of which Hydro Pure storage (reservoir) | | | | | | |
| | Of which Hydro Run-of-river and pondage | | | | | | |
| | Of which Hydro mixed pumped storage (renewable part) | | | | | | |
| | Of which Hydro mixed pumped storage (non renewable part) | | | | | | |
| | Of which hydro pure pumped storage (non renewable) | | | | | | |
| | Of which Hydro Marine (tidal/wave) | | | | | | |
| **Other renewable (not listed)** | | | | | | | |
| **Other non-renewable** | | | | | | | |
| **Non identified (other not listed)** | | | | | | | |
| | | | | | | | |
| **Total NGC** | | | | | | | |
| Comments | | | | | | | |

*Excel file template for collecting data on energy produced*

***Data collection Date: 07-08-2019***

| | |
|---|---|
| Country | France |
| Year From | 2016 |
| Year To | 2018 |

| Demand | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | | 2019 | 2018 | 2017 | 2016 | | |
| **Category** | | Value in TWh | Value in TWh | Value in TWh | Value in TWh | | Comment |
| **National load** | | | | | | | |
| | Of which Industry Consumption | | | | | | |
| | Of which Residential Consumption | | | | | | |
| | Of which Commercial Consumption | | | | | | |
| | Of which Other Consumption | | | | | | |
| | Of which Losses | | | | | | |
| | | *Of which Transmission losses* | | | | | |
| | | *Of which Distribution losses* | | | | | |
| **Pumping and storage** | | | | | | | |
| **Total Demand** | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Highest and lowest hourly load values | | | | | | | |
| **Year** | | 2019 | | 2017 | 2016 | | |
| **Category** | | Value in MW | | Value in MW | Value in MW | | Comment |
| **Highest load** | | | | | | | |
| | Date | | | | | | |
| | Time (Local time) | | | | | | |
| | Local Time shifting (UTC Ref) | | | | | | |
| **Lowest load** | | | | | | | |
| | Date | | | | | | |
| | Time (local time) | | | | | | |
| | Local Time shifting (UTC Ref) | | | | | | |

*Excel file template for collecting data on demand*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Data collection Date: 07-08-2019*** | | | | | | | |
| Country | France | | | | | | |
| Year From | 2016 | | | | | | |
| Year To | 2018 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Physical energy flows | | | | | | | |
| | Year | 2019 | | 2017 | 2016 | | |
| **Bordering country** | | Value in GWh | | Value in GWh | Value in GWh | | Comment |
| **Sum of import** | | | | | | | |
| **Sum of export** | | | | | | | |
| **Balance (Exp - Imp)** | | | | | | | |
| **Detail by Bordering country** | | | | | | | |
| **Spain** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Andorre** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Italy** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Switzerland** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Germany** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Luxemburg** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Belgium** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **UK** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |
| **Other** | | | | | | | |
| | Import | | | | | | |
| | Export | | | | | | |

*Excel file template for collecting data on electricity exchanges*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Data collection Date: 31-12-2019*** | | | | | | | |
| Country | France | | | | | | |
| Year From | 2016 | | | | | | |
| Year To | 2018 | | | | | | |
| | | | | | | | |
| Total length of the transmission grid | | | | | | | |
| | Date | 31.12.2019 | 31.12.2018 | 31.12.2017 | 31.12.2016 | | |
| **High voltage links** | | Value in km | Value in km | Value in km | Value in km | | Comment |
| **Total length of AC links (Overhead lines and underground cables)** | | | | | | | |
| | Of which lines operated at more than 400 kV | | | | | | |
| | Of which lines operated at 400 kV | | | | | | |
| | Of which lines operated at 220 kV | | | | | | |
| | Of which lines operated at 150 kV | | | | | | |
| | Of which lines operated at 132 kV | | | | | | |
| | Of which lines operated at 90 kV | | | | | | |
| | Of which lines operated at 60 kV | | | | | | |
| **Total length of HVDC links** | | | | | | | |
| | | | | | | | |
| **Total lenght of the transmission grid** | | | | | | | |
| Comments | | | | | | | |

*Excel file template for collecting data on transmission lines*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Data collection Date: 31-12-2019*** | | | | | | | |
| Country | France | | | | | | |
| Year From | 2016 | | | | | | |
| Year To | 2018 | | | | | | |
| | | | | | | | |
| Total transformers' capacity | | | | | | | |
| **Date** | | 31.12.2019 | 31.12.2018 | 31.12.2017 | 31.12.2016 | | |
| **Transformers** | | Value in MVA | Value in MVA | Value in MVA | Value in MVA | | Comment |
| **Total capacity of transformers with primary winding at 400 kV** | | | | | | | |
| | Of which transformers with secondary winding at 220 kV | | | | | | |
| | Of which transformers with secondary winding at 150 kV | | | | | | |
| | Of which transformers with secondary winding at 132 kV | | | | | | |
| | Of which transformers with secondary winding at 90 kV | | | | | | |
| | Of which transformers with secondary winding at 60 kV | | | | | | |
| **Total capacity of transformers with primary winding at 220 kV** | | | | | | | |
| | Of which transformers with secondary winding at 150 kV | | | | | | |
| | Of which transformers with secondary winding at 132 kV | | | | | | |
| | Of which transformers with secondary winding at 90 kV | | | | | | |
| | Of which transformers with secondary winding at 60 kV | | | | | | |
| **Total capacity of transformers with primary winding at 150 kV** | | | | | | | |
| | Of which transformers with secondary winding at 132 kV | | | | | | |
| | Of which transformers with secondary winding at 90 kV | | | | | | |
| | Of which transformers with secondary winding at 60 kV | | | | | | |
| **Total capacity of transformers with primary winding at 132 kV** | | | | | | | |
| | Of which transformers with secondary winding at 90 kV | | | | | | |
| | Of which transformers with secondary winding at 60 kV | | | | | | |
| **Total capacity of 90/60 kV transformers** | | | | | | | |
| | | | | | | | |
| **Total transformers' capacity** | | | | | | | |
| Comments | | | | | | | |

*Excel file template for collecting data on transformers' capacity*

## Key Performance Indicators

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ***Data collection Date:*** | | | | | | | | |
| Country | | | | | | | | |
| Year From | 2015 | | | | | | | |
| Year To | 2019 | | | | | | | |
| | | | | | | | | |
| **Key Performance Indicators** | Units | Date | 31.12.2019 | 31.12.2018 | 31.12.2017 | 31.12.2016 | 31.12.2015 | Comment |
| **Frequency Deviation Index (FDI)** | — | | | | | | | |
| **Transmission Losses** | % | | | | | | | |
| **Energy Not Supplied (ENS)** | MWh | | | | | | | |
| **Average Interruption Time (AIT)** | min | | | | | | | |
| **Interconnection Availability** | % | | | | | | | |
| **Transmission Line Availability** | % | | | | | | | |
| **Transmission Transformer Availability** | % | | | | | | | |
| **System Average Interruption Frequency Index (SAIFI)** | — | | | | | | | |
| **System Average Interruption Duration Index (SAIDI)** | min | | | | | | | |
| Comments | | | | | | | | |

*Excel file template for collecting Key Performance Indicators*

The members of the committee agreed that the historical data for the past 5 years was sufficient to represent the evolution of the electricity systems in the recent years. Moreover, it was agreed that the data of the countries not represented in the committee TC3 can be collected by the secretariat of Med-TSO via their official contact.

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