

Deliverable 2.1.2

Mediterranean Master Plan of Interconnections Network Analysis Guidelines

Project Roadmap



EC DEVCO - GRANT CONTRACT: ENPI/2014/347-006

“Mediterranean Project”

**Task 2 “Planning and development of the Euro-Mediterranean
Electricity Reference Grid ”**



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1 Object and Scope

According to the Step 0 of the Contract the Consultant is asked to structure the organization of the project with particular reference to technical relations with Med-TSO, schedule, milestones between contractual deadlines, deliverables and traceability of data and calculations. This document presents the organization of all tasks to be completed within the Network Studies for the Mediterranean Master Pan of Interconnections, taking into account and comply with all of that was established on the Invitation to Tender, namely the PART A - Technical Specifications. This document includes:

- a) the hierarchy of the Consortium and Med-TSO teams and the roles of the different players in the project (Med-TSO, the Coordinators, etc.);
- b) the tasks to be completed, the responsibilities allocated to each party and the corresponding time schedule;
- c) the status of the Med-TSO Database (DB) where the data is allocated. Appendix A describes the DB structure. Updates on the contents of the DB are out of scope of this document and will be approved separately.

2 Organization

2.1 Hierarchy of the Consortium

Figure 1 shows how the CON has been organized.

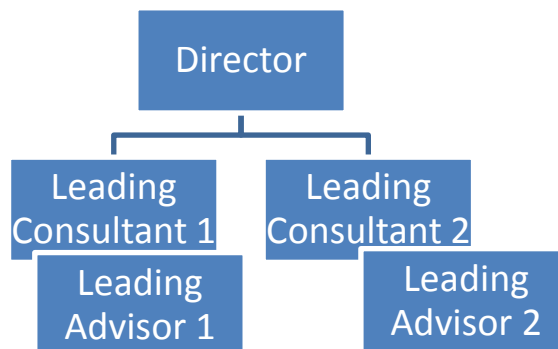


Figure 1 – Hierarchy of the CON

At the head of the project, Prof. Dr. Ramos will act as Director of the CON. The Director will have overseeing responsibilities on the project: planning and development, contract, consortium agreement, and invoicing, among others.

Beneath the project director are both of the two working groups, COMILLAS and INESC TEC. Each of them is formed by a Leading Consultant and a Leading Advisor. The Leading Consultants are in charge of data collection, the development of network models and snapshots, and the security analysis and reinforcement assessment. On the other hand, the Leading Advisors will provide advice to the Leading Consultants on data collection, methodology development, identification and evaluation of reinforcements, technology options,



among others. Concerning the COMILLAS working group, Dr. Echavarren will act as Leading Consultant, while Prof. Dr. Rouco will act as Leading Advisor. On the other hand, Dr. Carvalho will be the Leading Consultant in the INESC TEC working group, whereas the role of Leading Advisor will be play by Prof. Dr. Peças Lopes.

The CON structure will interact with the Med-TSO structure as depicted below:

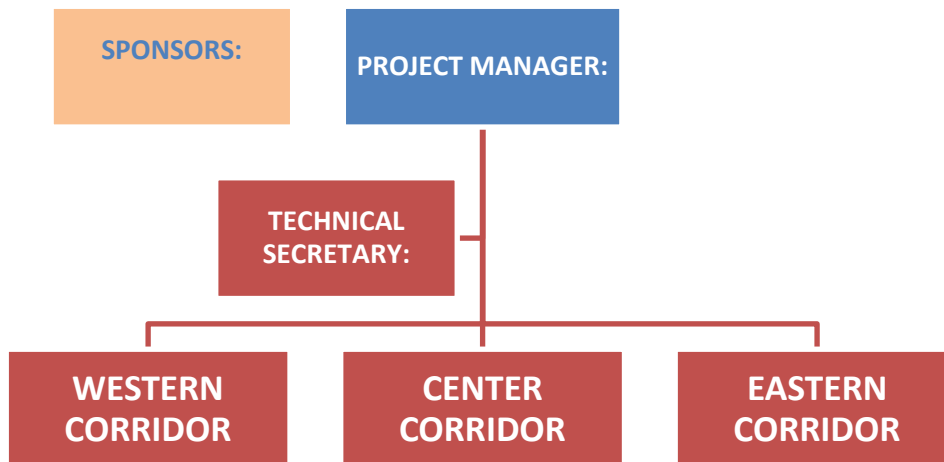


Figure 2 – Hierarchy of the Med-TSO structure

3 STEP 1 and STEP 2 – Definition of Energy Scenarios and Elaboration of Reference Network Models

The parts involved in this step and their roles are detailed below.

- **CON:** The Consortium is the responsible of assessing the quality of data uploaded at the share point on Med-TSO website, and use them to build the different snapshots. Dr. Echavarren will act as representative of CON, and coordinator of the tasks associated to STEP 1 and STEP 2.
- **TC1 Technical Secretariat:** TC1 TS is the responsible from the part of MedTSO for the data acquisition procedures, acting as an intermediary between each corresponding TSO and the CON in order to upload the relevant information at the share point on MedTSO website. TC1 TS will be regularly updated by CON, and may act as intermediary between CON and Coordinators for further information required during the data acquisition process.
- **Coordinators:** Coordinators of each corridor will be in charge of the communication of the CON with the corresponding TSOs of the relevant corridor, to recall the pending data and ensure that all pending issues are resolved. The coordinators should ensure that all information will be exchange between TSOs members of each Corridor and the CON. The coordinators should know all the main decisions of the 3 corridors and should share the decisions for the respective corridor, in order to guarantee that the 3 corridors will work in the same rules and harmonization.
- **TC1 members:** TC1 members of the corresponding TSOs shall provide to the TC1 TS the reference models and additional information to be communicated to the CON. They shall also be directly contacted either by the CON or the Coordinators in order to provide explanations and additional information. All the information exchange between the TC1 members and the CON should be communicated (include in CC) to the Project Managers and the respective Coordinator.

The basic **communication** procedure is:



- 1) **CON will provide to Coordinators a full report on the accessible data in the Med-TSO website, named “Snapshots Building Process”. In this report, the existing and pending data from different sources are listed. Also, deadlines to upload and modelling alternatives for missing information are established. A copy of this report will also be shared with TC TS.**
- 2) **Coordinators will contact corresponding TSOs to assure the status of their information, and if it necessary to recall the pending data and resolve pending issues, the corresponding deadline is remarked.**
- 3) **Coordinators will communicate the responses of corresponding TSOs to the CON, reporting communication (include in CC) to the Project Managers. Any direct information exchange between the corresponding TSOs and the CON should be communicated (include in CC) to the Project Managers and the respective Coordinator.**
- 4) **In case the answer of a corresponding TSO is insufficient, the CON will directly contact that TSO to ask for further clarifications, reporting conversations to Med-TSO relevant Coordinator and TC1.**
- 5) **In case of pending information, the CON is called to make the best possible assumptions, based on his own expertise and knowledge, and build the best possible models according to the data provided. The assumptions and following actions taken must be highlighted in the “Snapshots Building Process” document and subject to approval by TC1 members/Coordinators.**

The following Gantt chart describes the relevant tasks within STEP 1 and STEP 2.

Task	Responsible Party	Jul 17				Aug 17				Sep 17				Oct 17	
		W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2
Data Upload	Coordinators														
EASTERN CORRIDOR: Reference Network and Snapshots Construction	CON														
CENTER CORRIDOR: Reference Network and Snapshots Construction	CON														
WESTERN CORRIDOR: Reference Network and Snapshots Construction	CON														
EASTERN CORRIDOR: Reference Network and Snapshots Revision/Consolidation	CON Coordinators														
CENTER CORRIDOR: Reference Network and Snapshots Revision/Consolidation	CON Coordinators														
WESTERN CORRIDOR: Reference Network and Snapshots Revision/Consolidation	CON Coordinators														
Snapshots Approval	TC1														

Figure 3 – Gantt chart for STEP 1 and STEP 2

According to Figure 3, the different corridors will be processed in two steps. Following the order EAST-CENTER-WEST, the reference networks for each Project and the corresponding snapshots will be first built

¹ This step has not been finalised yet. Approval is pending from some TSOs. Also approval is not a responsibility of the Coordinators but of the relevant TSOs, each one for his own system.



and then revised. Finally, the TSOs will approve the final set of snapshots for their System, before the Network Studies step. Each TSO shall approve the snapshot for his own System. It is not possible to involve the coordinator in approving the grid provided by another TSO

Data requirements for the execution of these tasks are described in Appendix B. Any change to these requirements will be subject to approval separately from this document.

DELIVERABLES STEP 1 and STEP 2

- D1. Repository of Input Data (Archive)
- D2. Reference Network Models for Network Studies (Archive)
- D3. Snapshot Building Process (Document)

The contents of the deliverables of STEP 1 and STEP 2 are as follows:

D1. Repository of Input Data (Archive)

This deliverable corresponds to the DB that stores the data requirements described in Appendix B. The contents of this repository are shown in Appendix A.

D2. Reference Network Models for Network Studies (Archive)

This deliverable corresponds to the network models built by the CON for the snapshots of the Projects. The files in this DB are in PSS/E .raw file format version 33.

D3. Snapshot Building Process (Document)

This deliverable describes the process followed by the CON to build the snapshots required in the context of the Mediterranean Master Pan of Interconnections. It summarizes the status of the data available, reviews the different Projects based on the data completeness and describes how the different power systems are modelled as well as the criteria to allocate the generation and demand.

4 STEPS 3, 4 and 5 – Network Studies and Assessment of Reinforcements

With reference to the contract signed by Med-TSO and the CON, the set of activity described in this section encompasses Step 3 (Load Flow Analysis), Step 4 (Assessment of Reinforcements), and Step 5 (Analysis of Results).

The parts involved in this step and their roles are detailed below.

- **CON:** The Consortium is the responsible for performing the load flow analysis, for identifying and assessing the necessary reinforcements. This analysis must be carried out taking into account information that each TSO included in the reference documents of MedTSO and supplementary documents if needed for clarification, as well as direct contact with the TC1 member representing each TSO. Dr. Echavarren will act as representative of CON, and coordinator of the tasks associated to STEP 3, and Dr. Carvalho will be the responsible for STEP 4, and STEP 5. CON is in any case responsible of the results and their consistency with available data;
- **TC1 Technical Secretariat:** TC1 TS will overview the Network Studies procedures. TC1 TS will be weekly updated by CON;
- **Coordinators:** Coordinators of each corridor will be in charge of the coordination of the communication between the corresponding TSOs and of the CON, provide explanations, interpretation of documents, etc., if needed and ensure that all pending issues are resolved.
- **TC1 members:** TC1 members of the corresponding TSOs shall provide to the CON all necessary information for identifying and assessing the necessary reinforcements.



The basic **communication** procedure is:

- 1) **CON is responsible for the best use of the information gathered in STEP 2 and STEP 3. CON will organize and process the analysis, identify the reinforcements and evaluate them in cooperation with the relevant TSO, and structure the reports “Project by Project”**
- 2) **CON will provide TC1 members with a full report about the data necessary for the analysis to be performed, named “Security Analysis”. In this report, , deadlines to upload and modelling CON’s proposals for missing information are mentioned. A copy of this report will also be shared with Coordinators and TC1 TS.**
- 3) **CON will contact directly the corresponding TSOs requesting, if necessary, pending data and additional information/clarification, reporting communication to Coordinators and TC1 TS, the corresponding deadline is remarked.**
- 4) **Coordinators will evaluate the status of the information provided by corresponding TSOs of their corridor and make sure that all pending issues are resolved.**
- 5) **Finally, in case of pending or insufficient information, the corresponding mitigation actions specified in the “Security Analysis” will be activated.**
- 6) **For each Project, the CON submits results to the involved TSOs for preliminary approval. The document will contain at least:**
 - **the contingencies evaluated and the elements affected by violations, with indication of power rating/voltage violations both in absolute (A, MW/ kV) and relative (percentage of power/voltage nominal rating) term;**
 - **the details of remedial actions to be carried out;**
 - **reinforcement proposals (when necessary) as well as relevant selected to meet the security criteria of each TSO.**

The following Gantt chart describes the relevant tasks within STEP 3, STEP 4 and STEP 5.

Task	Responsible Party	Oct 17				Nov 17				Dec 17			
		W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
EASTERN CORRIDOR: Load Flow Analysis	CON												
CENTER CORRIDOR: Load Flow Analysis	CON												
WESTERN CORRIDOR: Load Flow Analysis	CON												
EASTERN CORRIDOR: Results Assessment and Reinforcement Proposal	CON Coordinators												
CENTER CORRIDOR: Results Assessment and Reinforcement Proposal	CON Coordinators												
WESTERN CORRIDOR: Results Assessment and Reinforcement Proposal	CON Coordinators TSOs												



EASTERN CORRIDOR: Assessment of Reinforcements	CON Coordinators TSOs													
CENTER CORRIDOR: Assessment of Reinforcements	CON Coordinators TSOs													
WESTERN CORRIDOR: Assessment of Reinforcements	CON Coordinators TSOs													
Network Studies Results Approval	Med-TSO Coordinators													

Figure 4 – Gantt chart for STEP 3, STEP 4 and STEP 5

According to Figure 4, the activities within STEP 3, STEP 4 and STEP 5 will be tackled per corridor or based on the completeness of the information provided by the TSOs. Following the order EAST-CENTER-WEST, the N, N-1 and selected N-2 load flow simulations for each snapshot of the Projects will be run. Then, the security indices computed will be assessed by the TSOs, which will be used to propose reinforcements. The reinforcements will be proposed by the CON, in cooperation and under the approval of the relevant TSOs. The effectiveness of the reinforcements proposed to solve the security problems identified will be evaluated to determine a rank for the reinforcements according to technical and economical criteria. Finally, the Coordinators and the TSOs will approve the set of reinforcements required per Project.

DELIVERABLES STEP 3, STEP 4 and STEP 5

- D4. Updated Repository of Input Data (Archive)
- D5. Network Studies Results (Archive)
- D6. Security Analysis (Document)
- D7. Assessment of Reinforcements (Document)

D4. Updated Repository of Input Data (Archive)

This deliverable corresponds to updates on the network models for the snapshots of the Projects. These updates correspond to modifications identified during the Network Studies. The files in this DB are in PSS/E .raw file format version 33.

D5. Network Studies Results (Archive)

This deliverable corresponds to the results of the Network Studies. The files in this DB are in MS EXCEL format and contain a list with the security indices calculated for each N-1 and selected N-2 load flow simulations of each snapshot.

D6. Security Analysis (Document)

This deliverable presents the process followed by the CON to run the power flow and contingency analysis over the different snapshots for each Project. It contains a review of the security criteria of the different power systems, the limits to be considered to calculate the security indices, the procedure for the contingency analysis of the different snapshots and a specification of the potential reinforcements to be analysed.

D7. Assessment of Reinforcements (Document)



This deliverable summarizes the results of the Network Studies, namely, the most important conclusions after the analysis of the security indices per snapshot and Project and the necessary reinforcements to guarantee the security levels for each power system.

5 STEPS 6 and STEP 7 – Fine-Tuning and Submission of Results

With reference to the contract this segment of activity encompasses: Step 6 (Fine-Tuning of Results) and Step 7 (Final Submission of the Results). This task consists on the final selection and validation of the internal network reinforcements required per Project. This is an interactive task to be carried out with the TSOs. After results validation, the Master Plan Report will be prepared and submitted. The conclusions and final results will be presented in the Master Plan Report. All previous documents, namely, the “Snapshot Building Process”, the “Security Analysis” and the “Assessment of Reinforcements” document will also be revised and updated.

Task	Responsible Party	Dec 17				Jan 18			
		W1	W2	W3	W4	W1	W2	W3	W4
Fine-Tuning of Results	CON Coordinators TSOs								
Final Submission of the Results	All								

DELIVERABLES STEPS 6 and STEP 7

D8. Master Plan Report (Document)

D9. Revision of Previous Documents for Approval (Document)

The contents of the deliverables of STEP 6 and STEP 7 are as follows:

D8. Master Plan Report (Document)

This deliverable corresponds to the Mediterranean Master Plan of Interconnections report which, in addition to the interconnection solutions, describes the necessary improvements and internal reinforcements in the networks of Med-TSO countries due to the interconnection Project together with all the costs associated (at standard costs and best practices). CON shall provide technologies and associated standard costs in its analyses.

D9. Revision of Previous Documents for Approval (Document)

This deliverable corresponds to updates necessary to previous documents produced by the CON following TSOs indication.



6 Appendix A - Repository Structure and Content Description

For an efficient and good management of Med-TSO project, an online repository has been created to store all the relevant documents and data. The access is opened to Med-TSO Members and to the CON. The repository is managed in a share point environment, following this address on Med-TSO website:

[Member Area Menu](#) > [Documents](#) > [TC and WG](#) > [TC1 - Planning/Development](#) > [Network Studies](#)

The repository presents three different categories of stored documents: **Contractual documents**, **Approved Technical documents**, **Draft Technical documents**, **MoM Call Network Studies**, **Draft MoM** and **Approved MoM**. Next subsections detail the content of each category inside the Med-TSO website.

6.1 Contractual Documents

This folder contains all the contractual documents signed with the Consortium, and includes:

- The Grid Planning Methodology
- Guidelines for the Coordinated Planning in Med-TSO Area: Survey and Tools for supporting the harmonized planning process
- Procedure for the Mediterranean Master Plan
- Contract with the CON

6.2 Approved Technical documents

This folder contains all technical documents that have been approved by the TC, data, reports, results of calculations at final stage, among others. This folder contains:

- MS EXCEL files with the details of the PiT selected for the 14 Projects
- Grid models for each country
- Project sheets

6.3 Draft Technical Documents

This folder contains a set of draft technical documents including:

- Structural Market data: a MS EXCEL file that contains the generation and exchange capacities, with a breakdown by countries, technologies and scenarios
- Common Point network data collection: an MS EXCEL file with the projections for generation and load for the 4 scenarios and Winter/Summer, grouped by countries and technologies, and also energy interchanges between countries
- “Snapshots Building Process” document and previous draft versions
- “Security Analysis” document and previous draft versions
- “Assessment of Reinforcements” document and previous draft versions
- Repository for provisional version of the snapshots of each Project (to be approved by TSOs)
- Repository for provisional version of the Network Studies results of each Project (to be approved by TSOs)

6.4 MoM Call Network Studies, Draft MoM and Approved MoM

These folders contain the Minutes of Meetings of the network studies in its draft and approved versions.



7 Appendix B - Data Requirements

This section summarizes the structure, formats and deadlines for the data required to perform the Networks Studies. Data comprises two main sources: Area Network Models and Projects.

7.1 Area Network Models

Location: *Member Area Menu > Documents > TC and WG > TC1 - Planning/Development > Network Studies > Approved Technical documents > [name]*

Deadline: *Friday, July 21st*

Minimum parameters required are:

- BUSES: number/name, kV, active power demand
- GENERATORS: bus number, machine identifier, minimum active power production, maximum active power production, generating technology
- LINES: number/name from, number/name to, reactance, rate(s)
- TRANSFORMERS: number/name from, number/name to, reactance, rate(s)
- AREAS: number/name, buses

Concerning the areas info, the information about existing interconnections between boundary systems is indispensable. In addition, new interconnections that belong to the Projects must be clearly identified in terms of the buses to be connected in the areas involved, the length of the interconnection, and the technology (AC/DC, single/double circuit). Finally, the area codes must match the following classification:

nº	Code	Name	nº	Code	Name
1	AL	Albania	14	PA	Palestine
2	DZ	Algeria	15	PT	Portugal
3	CY	Cyprus	16	SI	Slovenia
4	EY	Egypt	17	ES	Spain
5	FR	France	18	SY	Syria
6	GR	Greece	19	TN	Tunisia
7	IS	Israel	20	TR	Turkey
8	IT	Italy	21	AT	Austria
9	JO	Jordan	22	BG	Bulgaria
10	LE	Lebanon	23	FY	FYROM
11	LY	Libya	24	RO	Romania
12	ME	Montenegro	25	RS	Serbia
13	MA	Morocco	26	CH	Switzerland

Table 1 – Areas involved in the Mediterranean Project

The generating technology will be identified in the field “Owner 1” of the PSS/E format files. For the remainder of network formats, this information has to be clearly specified in TXT or MS EXCEL format. Finally, generating technology identification must match the following classification:

Generating technology	nº	Generating technology	nº
NUCLEAR	1	LIGHT OIL	18
HARD COAL OLD 1 (30% - 37%)	2	HEAVY OIL OLD 1 (25% - 37%)	19
HARD COAL OLD 2 (38% - 43%)	3	HEAVY OIL OLD 2 (38% - 43%)	20
HARD COAL NEW (44% - 46%)	4	OIL SHALE OLD (28% - 33%)	21
HARD COAL CARBON CAPTURE STORAGE	5	OIL SHALE NEW (34% - 39%)	22
LIGNITE OLD 1 (30% - 37%)	6	SOLAR PHOTOVOLTAIC	23
LIGNITE OLD 2 (38% - 43%)	7	SOLAR THERMAL	24
LIGNITE NEW (44% - 46%)	8	WIND OFFSHORE	25



Generating technology	n°	Generating technology	n°
LIGNITE CARBON CAPTURE STORAGE	9	WIND ONSHORE	26
GAS CONVENTIONAL OLD 1 (25% - 38%)	10	HYDRO PUMP STORAGE: ANNUAL RESERVOIR	27
GAS CONVENTIONAL OLD 2 (39% - 42%)	11	HYDRO PUMP STORAGE: DAILY RESERVOIR	28
GAS CCGT OLD 1 (33% - 44%)	12	HYDRO PUMP STORAGE: WEEKLY RESERVOIR	29
GAS CCGT OLD 2 (45% - 52%)	13	HYDRO ROR	30
GAS CCGT NEW (53% - 60%)	14	HYDRO SWELL ROR AND DAILY STORAGE:	31
GAS CARBON CAPTURE STORAGE	15	OTHER NON RES	32
GAS OCGT NEW (39% - 44%)	16	OTHER RES	33
GAS OCGT OLD (35% - 38%)	17	UNKNOWN	99

Table 2 – Generating technologies classification

In case of lack of network data, the corresponding area will be treated in the merged network model as a single bus.

If data on existing interconnections is incomplete, then every bus placed in an unidentified area will be considered as part of the network of the main area.

If data on generating technology is incomplete, then every generating unit with an unknown technology will be considered as non-dispatchable and will not be used.

7.2 Projects

Clusters or Projects are the interconnection projects to be assessed by Network Studies. The following are the clusters and the corridors they belong to.

Code	Cluster (Project)	Corridor	Code	Cluster (Project)	Corridor
MAPT	Morocco – Portugal (1 GW)	WEST	TNLYEY	Tunisia – Libya – Egypt (1000 MW)	CENTRAL
MAES	Morocco – Spain (1 GW)	WEST	TREY	Egypt-Turkey (3 GW)	EAST
DZES	Algeria – Spain (1 GW)	WEST	TRIS	Turkey-Israel (2 GW)	EAST
DZIT	Algeria – Italy (1 GW)	CENTRAL	EYJO	Egypt-Jordan (0.55 GW)	EAST
TNIT	Tunisia – Italy (0.6 GW)	CENTRAL	JOSYTR	Jordan-Syria-Turkey (0.8+0.6 GW)	EAST
TNIT2	Tunisia – Italy (+ 0.6 GW)	CENTRAL	GRBGTR	Grecia-Bulgaria-Turkey (0.5+0.5 GW)	EAST
DZTN	Algeria – Tunisia (+0.7 GW)	CENTRAL	GRCYIS	Greece-Cyprus-Israel (2.0+2.0 GW)	EAST

Table 3 – Projects and Corridors for the Mediterranean Master Plan

The minimum data required to build the snapshots for the projects considered are listed subsequently.

7.2.1 PiTs Files

Data repository: [Member Area Menu > Documents > TC and WG > TC1 - Planning/Development > Network Studies > Approved Technical documents > PiT detailed files](#)

Deadline: *Friday, July 21st*

One PiTs file for project, each of them contains the generation demand and energy transfers between systems for a set of PiTs (one MS EXCEL worksheet for each PiT). Currently, there are two different formats uploaded: Format 1 and Format 2.

Format 1: Used by Western and Eastern corridors. All information regarding active power generation, active power demand and active power exchange is contained in two tables, as **Errore. L'origine riferimento non è stata trovata.** depicts:



PIT number:	scenario	S3	GENERATION																				EXCHANGE																			
			AL		DZ		EG		FR		GR		IT		JO		LE		MA		PA		PT		SI		ES		SY		TN		ITs		Area A		Area B					
time	hour#	4616																																								
1																																										

Figure 5 – Example of PIT file Format 1

Format 2: Used for the Central corridor. It consists of individual tables for each country, plus the relevant active power exchanges. Errore. L'origine riferimento non è stata trovata. depicts an example.

PIT number:		scenario		S4	
time		05/04/2006 13:00			
hour#		2258			
GENERATION					
8	ALGERIA DZ	DZ-NUCLEAR	0	Italy Itn	Itn-HARD COAL OLD 1 (30% - 37%)
10	DZ-GAS CCGT OLD 2 (45% - 52%)	2624.3		Italy Itn	Itn-HARD COAL OLD 2 (38% - 43%)
11	DZ-GAS CCGT NEW (53% - 60%)	8362.71		Italy Itn	Itn-GAS CCGT OLD 1 (33% - 44%)
12	DZ-GAS OCGT OLD (35% - 38%)	724.5		Italy Itn	Itn-GAS CCGT OLD 2 (45% - 52%)
13	DZ-WIND ONSHORE	1735.42		Italy Itn	Itn-GAS CCGT NEW (53% - 60%)
14	DZ-SOLAR PHOTOVOLTAIC	0		Italy Itn	Itn-GAS OCGT NEW (39% - 44%)
15	DZ-SOLAR THERMAL	0		Italy Itn	Itn-LIGHT OIL
	Italy Its			Italy Itn	Itn-HEAVY OIL OLD 1 (25% - 37%)
18	Its-HARD COAL OLD 1 (30% - 37%)	0		Italy Itn	Itn-HYDRO ROR
19	Its-HARD COAL OLD 2 (38% - 43%)	0		Italy Itn	Itn-HYDRO PUMP STORAGE: ANNUAL RESERVOIR
20	Its-HARD COAL NEW (44% - 46%)	0		Italy Itn	Itn-HYDRO PUMP STORAGE: DAILY RESERVOIR
21	Its-GAS CCGT OLD 1 (33% - 44%)	51		Italy Itn	Itn-WIND ONSHORE
22	Its-GAS CCGT OLD 2 (45% - 52%)	110.47		Italy Itn	Itn-SOLAR PHOTOVOLTAIC
23	Its-GAS CCGT NEW (53% - 60%)	3409.56		Italy Itn	Itn-OTHER RES
24	Its-GAS OCGT OLD (35% - 38%)	0		Italy Itn	Itn-OTHER NON RES
25	Its-GAS OCGT NEW (39% - 44%)	0		Libya LY	LY-GAS CONVENTIONAL OLD 2 (39% - 42%)
26	Its-LIGHT OIL	0		Libya LY	LY-GAS CCGT OLD 2 (45% - 52%)
27	Its-HEAVY OIL OLD 1 (25% - 37%)	0		Libya LY	LY-GAS CCGT NEW (53% - 60%)
28	Its-HYDRO ROR	916.61		Libya LY	LY-GAS OCGT NEW (39% - 44%)
29	Its-HYDRO PUMP STORAGE: ANNUAL RESERVOIR	0		Libya LY	LY-HEAVY OIL OLD 2 (38% - 43%)
30	Its-HYDRO PUMP STORAGE: DAILY RESERVOIR	0		Libya LY	LY-WIND ONSHORE
31	Its-WIND ONSHORE	174.49		Libya LY	LY-SOLAR PHOTOVOLTAIC
32	Its-WIND OFFSHORE	7.38			

EXCHANGE	
Itn-AT	-348.51
Itn-CH	-3009.83
Itn-SI	-356.97
Its-ME	-1154.17
FR-ITn	4350
GR-ITs	121.64
Itn-Its	4000
EY-LY	550
TN-LY	500
TN-ITs	
TN-DZ	-300
MA-DZ	238.63
DZ-ITs	558.52

Figure 6 – Example of PIT file Format 2

Both formats are legible and readable, although Format 1 is more complete and easier to read.

7.2.2 Merit Order for Generating Units

Location: (to be agreed)

Deadline: **Friday, July 28st**

For the active power dispatch, the PiTs files provide active power production, with breakdown by technologies and areas. To readjust the generating units among the network, a merit order is required. Each of the systems involved has to provide a corresponding merit order of their generating units, with the following basic information:

- Bus number, machine identifier, merit order



There is no an agreed format (TEXT or MS EXCEL files are OK), as far as the aforementioned data is readily accessible from the file. For those systems that do not provide a valid merit order list, the “Variable Cost” field from PiTs files will be used instead.

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