

# NOMENCLATURE INFORMATION OF TIME PROFILE CSV FILES

## 1 Introduction

The time profiles available for Soria are located in the folder “.\StoRIES\_RefCase\_Config\_rev04\_input” in CSV format.

The format consists of 2 columns, the first one being the time in seconds.

There are 4 types of CSV:

1. P\_base electric profile. The second column represents electrical power in kW
2. P\_base thermal profile. The second column represents thermal power in kW
3. nu profile. The second column represents efficiency in p.u.
4. epz. The second column represents the cost €/kW.h of the purchased energy, and the third column represents the selling price in €/kW.h.

*Note: the CSV epz has a first row of text values with the name of the variables, while the rest of CSV start in the first line with numerical values.*

To know what type of subsystems or blocks of the model that use each profile, the INFO tab of the configuration file “StoRIES\_RefCase\_Config\_rev04.xlsx” (hereinafter, **configuration file**) can be consulted. If in parameters 9, 11, 13, or 18 an 'x' appears, it means that said subsystem uses a time profile of type P\_base electric profile, P\_base thermal profile, nu profile or epz, respectively (and on the contrary, if an “N/A” appears, it means that it does NOT use said time profile). In the figure 1 this parameters are remarked in blue.

*Note: type of subsystem or model in not the subsystem; in the model there are several subsystems of the same type of subsystem. The type of subsystem is described in “Class Name” (line 8 in CONFIG Sheet). In the figure 1 the “class name” is remarked in orange.*

NAME			DESCRIPTION	LEVEL 1	LEVEL 2	LEVEL 3															
Class Name	NAME	DESCRIPTION	CRD	hNET	hNET	CT	PPMP	PPMP	nuCp	Scp	SPMP	ESSm	SPMP_Th	G	STPwRK	STPwRK	PCM	TEp	G		
	TYPE	Model	Model File	Electricity	Thermal	Power	Power	Power	Non-Shift	Shiftable	C-Synchronous	Energy	Sto	Sto	Synchronous	External	ES	Solar	Solar	Thermal	External
ID in SBD	Level 1 (no.)	Grid type	N/A	X	X	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	hNET	
	Level 2 (no.)	Container or aggregation	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Level 3 (no.)	Model	N/A	N/A	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Type Simulink		N/A	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Interfaces	Model	Container (subsystem that contains models)	N/A	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Model	In library	N/A	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	swPP	[Simulink subsystem-out]	From ctrlSYS (constant [1] (logic 0-1))	N/A	N/A	N/A	X	X	X	X	N/A	X	N/A	X	N/A	X	X	N/A	X	N/A	
	PP	POWER PROGRAMMING (power reference)	From ctrlSYS (constant [1W])	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	TOW	Initial time of a short profile	From ctrlSYS (constant [1s])	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	TP_in	THERMAL POWER	[W]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	TP_in	ELECTRICAL POWER	[W]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	EP_out	TOTAL OUTPUT ELECTRICAL POWER	Text (sheet name where [N])	N/A	X	X	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	
	SOC	State of Charge	Text (sheet name where [N])	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	SOH	State of Health	Text (sheet name where [N])	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	TP_out	TOTAL OUTPUT THERMAL POWER	Text (sheet name where [N])	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X	
	TP_ZEP	THERMAL POWER	Text (sheet name where [N])	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Parameters	[Simulink mask parameters]		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	0 Location	Text	[1]	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	1 Day	Initial day of the simulation in number (1-365)	Value	[1 (no.)]	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2 Integration Time	Integration time step in seconds	Value	[1s]	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	3 End Time	en time in seconds	Value	[1s]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	4 base file	file path (name and complete path)	Text	[1]	N/A	N/A	N/A	N/A	X	X	X	X	X	N/A	N/A	X	X	X	X	N/A	
	5 P nominal	nominal power in the simulation	Value	[kW]	N/A	N/A	N/A	N/A	X	X	X	X	X	X	N/A	X	X	X	X	N/A	
	6 P base	base power of the power profile	Value	[kW]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	7 Profile case val1	column selection (selection of the power profile from sheet (number value))	[1]	N/A	N/A	N/A	N/A	X	X	X	X	N/A	N/A	N/A	N/A	X	X	X	X	N/A	
	8 Profile case val2	column selection (selection of the power profile from sheet (number value))	[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	9 P_base electric profile	CSV name where the electric power profile is located	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	10 P_base electric profile type	type of electric power profile (restricted values)	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	11 P_base thermal profile	CSV name where the thermal power profile is located	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	12 P_base thermal profile type	type of thermal power profile (restricted values)	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	13 nu profile	CSV name where the efficiency profile is located	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	14 nu profile type	type of profile (currently defined "annual", "diary", Restricted values)	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	15 Type of ESS	Selection of the type of storage	Restricted values	[1]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	16 Noss	Number of stacks of storage	[1 (no.)]		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	N/A	N/A	N/A	X	N/A	N/A	N/A	
17 SocI	Initial State of Charge of the simulation	Text		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
18 epz	CSV name where the electricity prices profile is located	Text	[1 (no.)]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Figure 1: CONFIG tab of configuration file.

## 2 How is define the CSV used by each Simulink subsystem

The CSV name used by a subsystem is composed as follows:

**TP [Location]\_ [CSV\_name]\_ [ Profile case val1]\_ [ Profile case val1].csv.**

**[Location]** - is the location chosen for the case to be analyzed and the value of “parameter 0” or “Location” of the “Model File” is taken. For example, it is the value of cell **D20** of the **CONFIG** tab of the configuration file.

**[CSV\_name]** - is the name of the time profile, and appears, for each column or subsystem, in parameters 9, 11, 13, or 18 an 'x' appears, is that such subsystem uses a time profile of type P\_base electric profile, P\_base thermal profile, nu profile or epz, respectively. For example, in the CONFIG tab of the configuration file it can be seen that for the subsystem named “WG - PPMp” (name cell L7), the value of parameter 9 (cell L29) is “WG\_Pe”.

**[Profile case val1]** and **[ Profile case val1]** - are the values with which the “option” or profile case is defined. These values appear in parameter 7 and parameter 8 respectively. When there is only one option, it takes the values of 1 and 1. When there are more options, a comment has been included in the cells of the parameters.

For example, for the subsystem named “Ctbu - TCp”, parameter 7 has a comment indicating:

Vector of type of consumption:

- 1 - Hospital ENEA summer [W]
- 2 - Hospital ENEA winter [W]
- 3 - Offices ENEA summer [W]
- 4 - Offices ENEA winter [W]
- 5 - Hotel ENEA summer [W]
- 6 - Hotel ENEA winter [W]
- 7 - Industries ENEA [W]
- 8 - Residential ENEA [W]

This assumes that the model “Ctbu - TCp” uses the named csv:

**TP\_Soria\_CtBu\_Pt\_008\_001.csv** ->

- **Cell D20;** Parameter 0 Location of CBD-> **Soria**
- **Cell Z31;** Parameter 11 P\_base thermal profile of Ctbu - TCp -> **CtBu\_Pt**
- **Cell Z27;** Parameter 7 Profile case val1 (column selection by case) from Ctbu - TCp for a type of profile “residential -> **8**
- **Cell Z28;** Parameter 8 Profile case val2 (column selection by sub-case) of Ctbu - TCp -> **1**

### 3 How the parameter DAY affects to the time profile used by Simulink model

There are different types of profiles:

- CSV types 1-3 can be annual, daily, or short profiles.
- CSV type 4 (epz - electricity price) is always an annual type.

The profile type is defined in parameters 10, 12 and 14 for P\_base electric profile, P\_base thermal profile and nu profile, respectively.

In case of annual profiles, the XlsCsv2yaml.m script reads the entire CSV, but extracts the information of the day defined in “parameter 1” “Day” (i.e., it is the value of cell D21 of the CONFIG tab of the configuration file).

Thus, the XlsCsv2yaml.m script generates a single day profile, which is the one that appears in the yaml file.

This implies that changing the value of “parameter 1” “Day” implies a change in the profiles, as long as these profiles are of annual type.

In addition, in case of short profiles, the XlsCsv2yaml.m script reads the CSV and compose a diary profile completing with 0 the rest of the time profile and taking into account the initial time of each short profile. This initial time is defined in the CSV of the control information that is received from the Optimization.

Time	WG_PPMP_swPP	PV_PPMP_swPP	Cbui_NSCp_swPP	CEV_SCP_swPP	CPI_SCP_swPP	BAT_ESSm_PP	SC_ESSm_PP	HP_ESSm_PP	CSP_MS_STPwRK_PP	RC_SPMp_swPP	TPS_MS_STPwRK_swPP	PCM_ESS_PP	Cbui_TCp_swPP	CEV_SCP_IDN	CPI_SCP_IDN
0	1	1	1	1	1	1	2481132051	144589027	271220809	0	0	1	10000	3400	25325
3600	1	1	1	1	1	1	2460725689	7226965845	293761875	0	0	1	10000	28800	68400
7200	1	1	1	1	1	1	228063631	9788881579	2682874639	0	0	1	10000	39600	81000
10800	1	1	1	1	1	1	1728898404	2407089894	2218815597	0	0	1	10000	79200	81000
14400	1	1	1	1	1	1	1681840309	1942422648	154215815	0	0	1	10000	81000	81000
18000	1	1	1	1	1	1	1481484966	254231369	7039028305	0	0	1	10000	81000	81000
21600	1	1	1	1	1	1	3384580207	4294715202	1213992971	0	0	1	10000	81000	81000
25200	1	1	1	1	1	1	-1581222032	3282479096	4757289967	0	0	1	10000	81000	81000
28800	1	1	1	1	1	1	2777940227	4337748208	898160495	0	0	1	10000	81000	81000
32400	1	1	1	1	1	1	-4310420549	-1941748068	-100895276	0	0	1	10000	81000	81000
36000	1	1	1	1	1	1	-4887220218	-1584025952	-5730147226	0	0	1	10000	81000	81000
39600	1	1	1	1	1	1	-2791142161	-1950764558	-3355822758	0	0	1	10000	81000	81000
43200	1	1	1	1	1	1	-1254305050	-1431303897	-2108970611	0	0	1	10000	81000	81000
46800	1	1	1	1	1	1	764018785	2473518449	-2720131269	0	0	1	10000	81000	81000
50400	1	1	1	1	1	1	2641588474	-1947178303	3135379369	0	0	1	10000	81000	81000
54000	1	1	1	1	1	1	3092891401	2008943925	115264001	0	0	1	10000	81000	81000
57600	1	1	1	1	1	1	2798832307	2320846417	1688145384	0	0	1	10000	81000	81000
61200	1	1	1	1	1	1	2460171669	-1339117413	1988394882	0	0	1	10000	81000	81000
64800	1	1	1	1	1	1	1394180851	-2816515957	2255744852	0	0	1	10000	81000	81000
68400	1	1	1	1	1	1	3139591881	-4840449328	1916919852	0	0	1	10000	81000	81000
72000	1	1	1	1	1	1	-188483283	6873650389	1820401852	0	0	1	10000	81000	81000
75600	1	1	1	1	1	1	-5785895297	-3376072788	1386770956	0	0	1	10000	81000	81000
79200	1	1	1	1	1	1	-6770513718	-8891608623	6407113412	0	0	1	10000	81000	81000
82800	1	1	1	1	1	1	-743519037	-2983852184	2561785625	0	0	1	10000	81000	81000

Figure 2: CSV with the control information in the current state (17/10/2024).

Note: in the main MATLAB script “ElectricSys\_CEDERSimple01\_cederDataIn\_ExcelCSV2Sim.m”, the part of the “future” XlsCsv2yaml.m function is corresponding to step 1.

```

ElectricSys_CEDERSimple01_cederDataIn_ExcelCSV2Sim.m  x +
1 - clear all; restoredefaultpath %%%%%%%%%%%%%%%
2 - clearvars -except INstruct; restoredefaultpath
3 - addpath('dataSim'); CIEMAT_EDLC_SC_load
4 - addpath(genpath('auxFunc'))
5
6
7 - caseNm = 'StoRIES_RefCase_Config_rev04';
8 - MDLfile = 'ElectricSys_CEDERSimple01';
9 - UTfile = 'ElectricSys_CEDERSimple01_cederDataIn_ut_baseCase00.mat';
10 - plotON = 1;
11 - cfgON = 1;
12
13 - INfile = [caseNm '.xlsx']; INdir = [caseNm, '_input']; OUTdir = [caseNm, '_output'];
14
15 %% STEP 1 - READ DATA FROM EXCEL
16 - fprintf('***> Loading data to workspace and generating YAML file<<<*\n'); tic
17
18 - [INstruct,OUTyamlNmTxt] = t32_RefCase_ReadCfg_4xlscsv2yaml(INfile,INdir,caseNm);%clear INstruct
19
20 - fprintf(' DONE - elapsed time %05.3f s\n',toc)
21
22 %% STEP 2 - SIMULATION & DATA STORAGE
23 - fprintf('***> Reading YAML file, simulating case, and storing data in CSV and JSON files<<<*\n'); tic
24
25 - [out]=t32_RefCase_RunSlx_4yaml2out(OUTyamlNmTxt,OUTdir,MDLfile,cfgON,plotON,UTfile);
26
27 - fprintf(' DONE - elapsed time %05.3f s\n',toc)
28
29 %% FUNCTION STEP 1
30 - function [INstruct,OUTyamlNmTxt]=t32_RefCase_ReadCfg_4xlscsv2yaml(INfile,INdir,caseNm) ...
31 - %%%%%%%%%>>>>> aux fun [t32_RefCase_ReadCfg_4xlscsv2yaml] <<<<<%%%%%%%%
32
33 - function y = contain_(x,x_) ...
34
35 - function y = str2num_(x) ...
36
37 - function P_profVal = readTimeProf(P_profType,INfile,INstruct,mdlName,dayIN,t_Pvct,idxP) ...
38
39 %% FUNCTION STEP 2
40 - function [OUTstruct,outNm]=t32_RefCase_RunSlx_4yaml2out(OUTyamlNmTxt,OUTdir,MDLfile,cfgON,plotON,UTfile) ...
41 - %%%%%%%%%>>>>> aux fun [t32_RefCase_RunSlx_4yaml2out] <<<<<%%%%%%%%
42
43 - function slxcfg_rst(mdl) ...
44
45 - function [newConfigObj, cfg_nm_old] = slxcfg_new(mdl,cfg_nm_new) ...
46
47 - function slxtst_ut(UTfile,out) ...

```

Figure 3: Code of the main MATLAB script “ElectricSys\_CEDERSimple01\_cederDataIn\_ExcelCSV2Sim.m”