SMR 1585 - 5

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WORKSHOP ON DESIGNING SUSTAINABLE ENERGY SYSTEMS
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PREPARATION OF MODEL OUTPUT TABLES

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These are preliminary lecture notes, intended only for distribution to participants.

Preparation of model output tables

A.Galinis

Output files of MESSAGE

- *MPS file:* standardized matrix format, describing linear program – results of MXG
- *Technology chain file:* description of energy chain
- *Technology dictionary file:* MXG encoded names of all technologies
- *Solution file:* results of optimization
- *Sensitivity file:* information for sensitivity analysis
- *Tabular output file:* results in the form of tables
- *Table of contents file:* table of contents for the tabular output file

Extracting the final model results

In the interactive mode

Through cin file

Extracting the final model results

In the Interactive Mode

- **It provides a flexible framework to choose certain parts of the model's solution results in form of tables and graphs;**

- **It allows the user to get the micro-level results on four major component of the model i.e. technologies, resources, constraints/relations and energy forms.**

Interactive mode (1)

Interactive mode (2)

Options for output of results:

In form of tables;

In form of graphs;

For one or several cases;

For one or several scenarios;

Output can be saved in form of ggi files that can
be used for other model runs;

Can be exported to Microsoft Excel for further
processing;

Extracting the final model results

Through cin File

- **The user prepares an input file giving names of the model's variables generated by the program to extract the results;**

- **It allows the user to formulate some algebraic relations between variables to calculate some new variables from the results.**

Purpose of the cin file

To give user more freedom to prepare results in format defined by user and for variables selected by user;

To facilitate user to define an algebraic relation to compute some new variables for extracting results.

# Features of the cin File

It contains detailed instructions on creation of tables and graphs for the program CAP, individually for each tables and graphs;

Each table is specified in two parts:

- General data which are defined in the form of keywords (required and optional),

- Time series which are defined in the form of equations among variables of the MXG.

Preparation of pre-selected tables
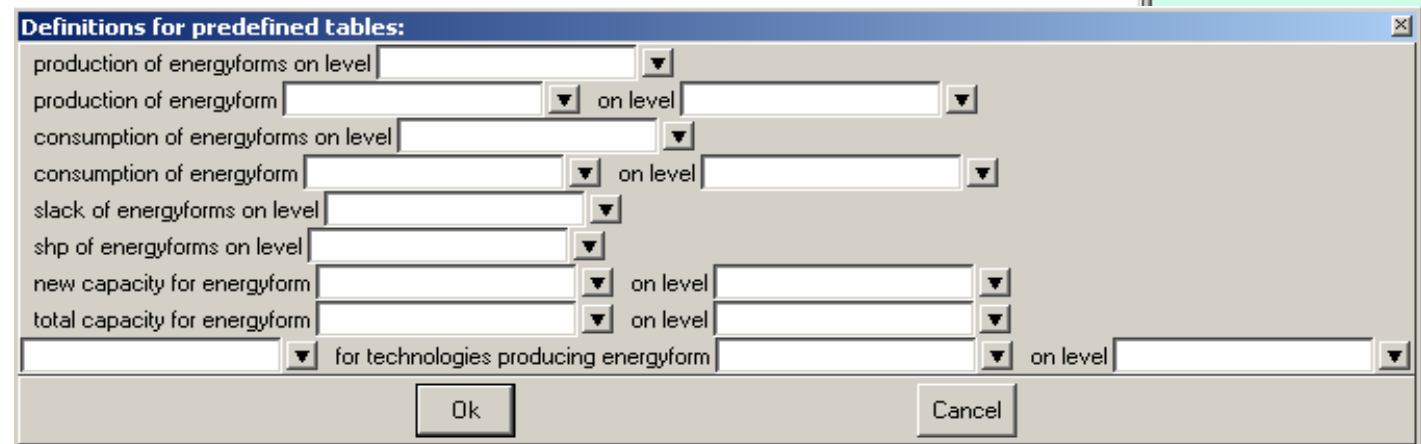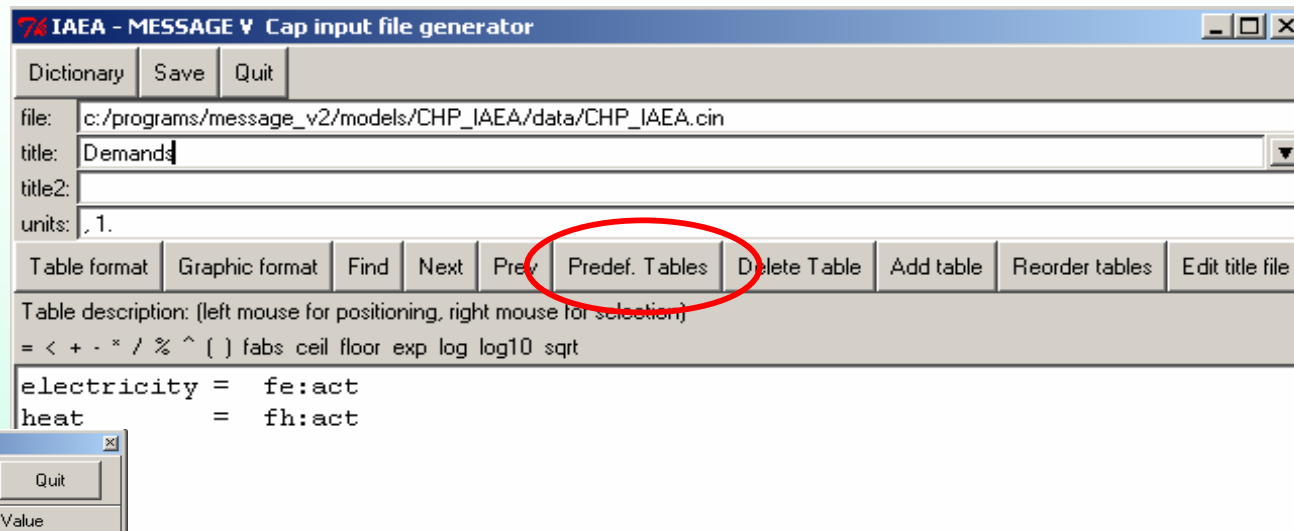
Preparation of user defined tables (1)

Time series definition

Time series are defined in the form of usual mathematical equation where each line contains one equation with its time series name:

$$coal\_costs = pcec:act * pcec:vom$$

Name of variable

Descriptor

*coal _cost is the name of the time series , is obtained by multiplying (character *) the annual activity (pcec:act) and the respective variable operation and maintenance costs (pcec:vom) of the technology called pcec in MXG*

Preparation of user defined tables (2)

Descriptors from the solution file

act	activity (input)
inp	activity (input)
sla	slack activity
lol	lower limit
upl	upper limit
shp	shadow price
obx	objective function value x
ony	objective function value y
lev	levellized cost
atu	1 if at upper limit
atl	1 if at lower limit
tot	total output
out	activity (output)
use	use of fuel f on level 1 If:use
prd	production of fuel f on level 1 If:prd
tic	total installed capacity
prc	average fuel prices calculated from chain
sin	sum over inputs to a technology
spr	sum over products from a technology
cic	cumulative installed capacity

Preparation of user defined tables (3)

Descriptors from the input file

inv	investment costs
fom	fix O&M costs
vom	variable O&M costs
prl	period length
lev	levellized costs
tot	lev + input costs
cst	costs of add. rows or resource
rem	remaining resources
vol	initial volume of resource
ei.	energy input .
eo.	energy output .
ci.	construction input .
co.	Construction output .
eff	main efficiency
plf	plant factor
pll	plant life
hia	historic activity
lr.	length of load region lr .
fr.	Fraction of lr .

Preparation of user defined tables (4)

Mathematical operators and functions in CAP

Mathematical Operators

+	addition
-	subtraction
*	multiplication
/	division
^	power
%	integer division

Functions

fabs( )	absolute value
cell ( )	ceiling
floor ( )	floor
exp( )	exponential
log( )	natural logarithm
log10( )	logarithm base 10
sqrt( )	square root

Preparation of user defined tables (5)

Characteristics of the cin File

- **The cin file can be prepared before and/or after run the MXG and optimization, i.e. manually and/or using program provided mathematical operators, functions and a set of commands, respectively**

- **The calculation of all variables defined in all the tables in the cin file for the selected scenario can only be made after run the CAP on the base of successful completion of MXG and optimization**

- **The extraction of the results from the cin file can then be viewed on the dropdown menu of the 'Results' command – 'tables' and 'graphs'**

View of results
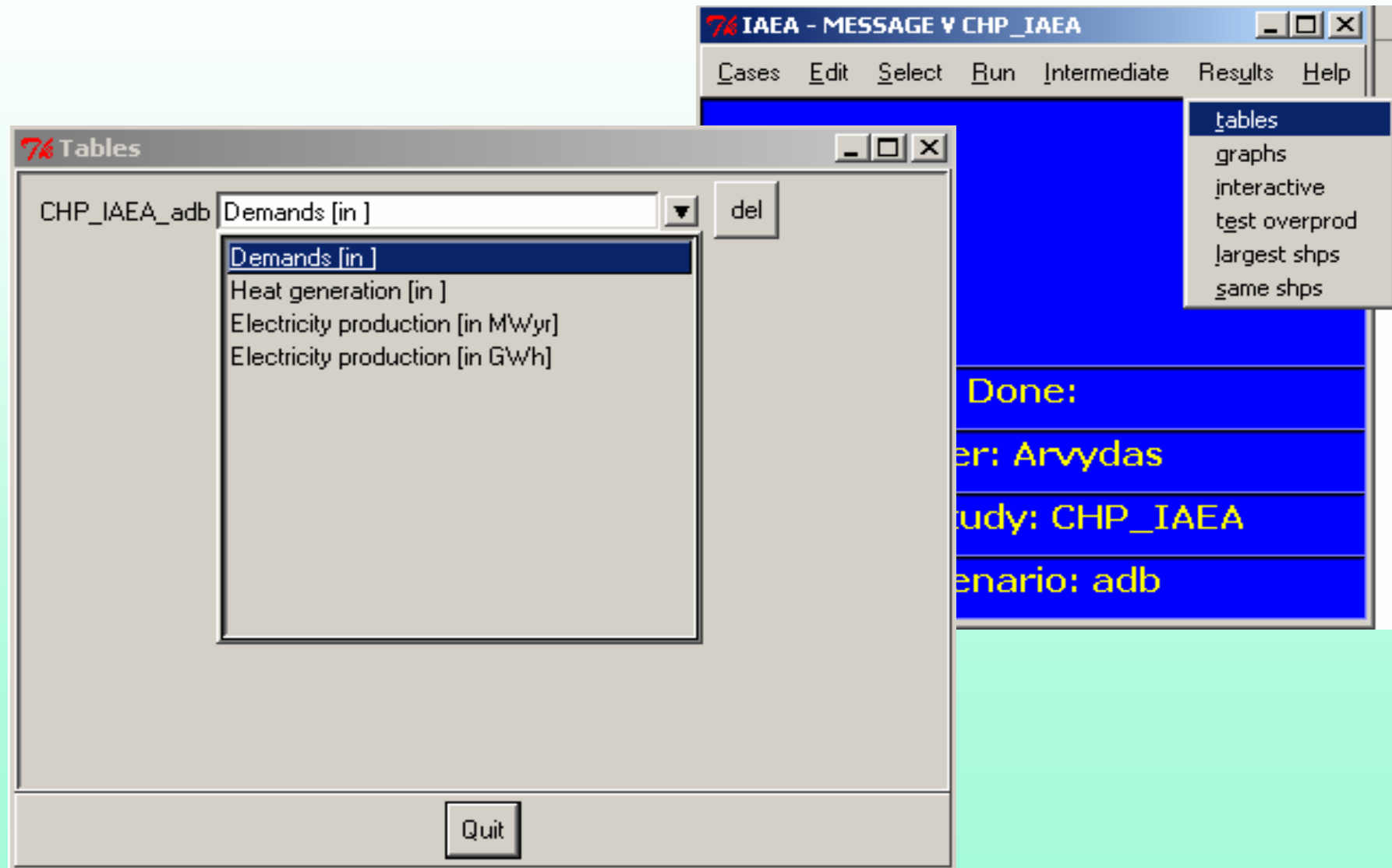
Preparation of the cin File

open cin file from the 'Edit' command

⬇

select existing or create new cin file

⬇

select scenario

⬇

edit cin file (title, units, format of the table/graph)

⬇

prepare the tables

⬇

save cin file

⬇

calculates the tables defined in the cin file (run CAP)

⬇

extracting the results at the 'tables' and 'graphs'
from the 'Results' command