

*EFFLOCOM WORKSHOP 13-06-2003*

# *A simulation load curve model*

# **AMOS**

*Long term load curve forecasting*

# *A simulation load curve model*

\* To forecast the long term global load curve taking into account

- economic growth
- technological changes
- social evolution

# *A simulation load curve model*

- \* To simulate effects of different forecast yearly scenarii on the national consumption
- \* To simulate effects of new hypothesis (behaviours, end-uses...) on an agreggate load curve
- \* To take into account different climatic scenarii

# *A simulation load curve model*

## *A sectorial Approach*

*\* Global consumption is broken down into different homogeneous sectors*

- Industrial activities (8)
- Domestic end-uses (5)
- Commercial activities and end-uses(5)
- Rest

*\* For every sector, we are able to simulate a forecast load curve for every hour of the year*

# *A simulation load curve model*

## *A sectorial Approach*

### Two steps

#### \* Energy

To split up the total energy consumption of a year in different sectors

To forecast these volumes for the following years

=>market and economical studies

#### \* Load : to distribute annual consumption on the 8760 hourly points

To define a load profile for each sector

To cross energy and profile

To aggregate every single sector load curve

# *A simulation load curve model*

## *Consumption forecasting*

### *\* Elements which affect demand*

Socio-economic variables (demography, level and structure of the economic activity), price of energy sources)

Voluntarist actions (energy policy)

Utility's actions (commercial action, tariff policy)

### *\* Per sector, a detailed analysis per market and end-uses*

Industry : Production per sector

Commercial : Surfaces per sector

Residential sector : Number of households and main uses (space heating, water heating, lighting ,household appliances)

# A simulation load curve model

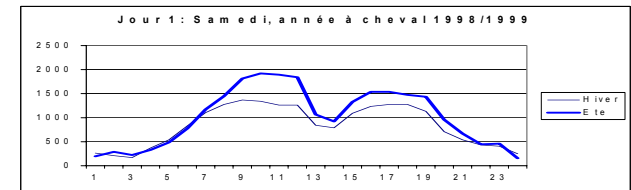
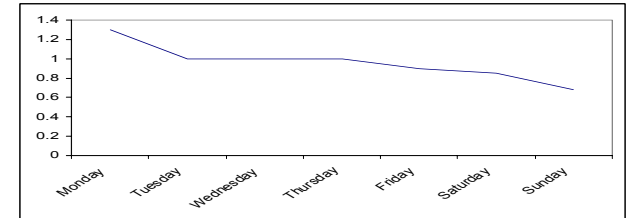
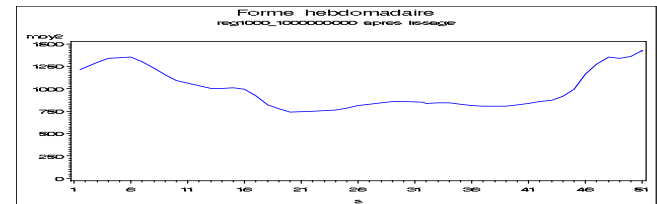
Load curve = Profile \* consumption = 4 coefficients \* consumption

Consumption growth rate  $t_i$

Seasonal coefficient  $k_i$

Modulation within a week  $p_{ij}$

Modulation within a day  $q_{hij}$



$$\Rightarrow P_{hij} = W / (24 * N) * t_i * k_i * p_{ij} * q_{hij}$$

$h$  hour,  $j$  day,  $i$  week,  $W$  annual consumption,  $N$  number of days in the year

# *A simulation load curve model*

## *Application example*

*What is the effect of a suppression of the tariff peak hours / off peak hours on the load curve (peak hours)?*

# *A simulation load curve model*

## *Application example*

*Domestic customers : 2 different tariffs*

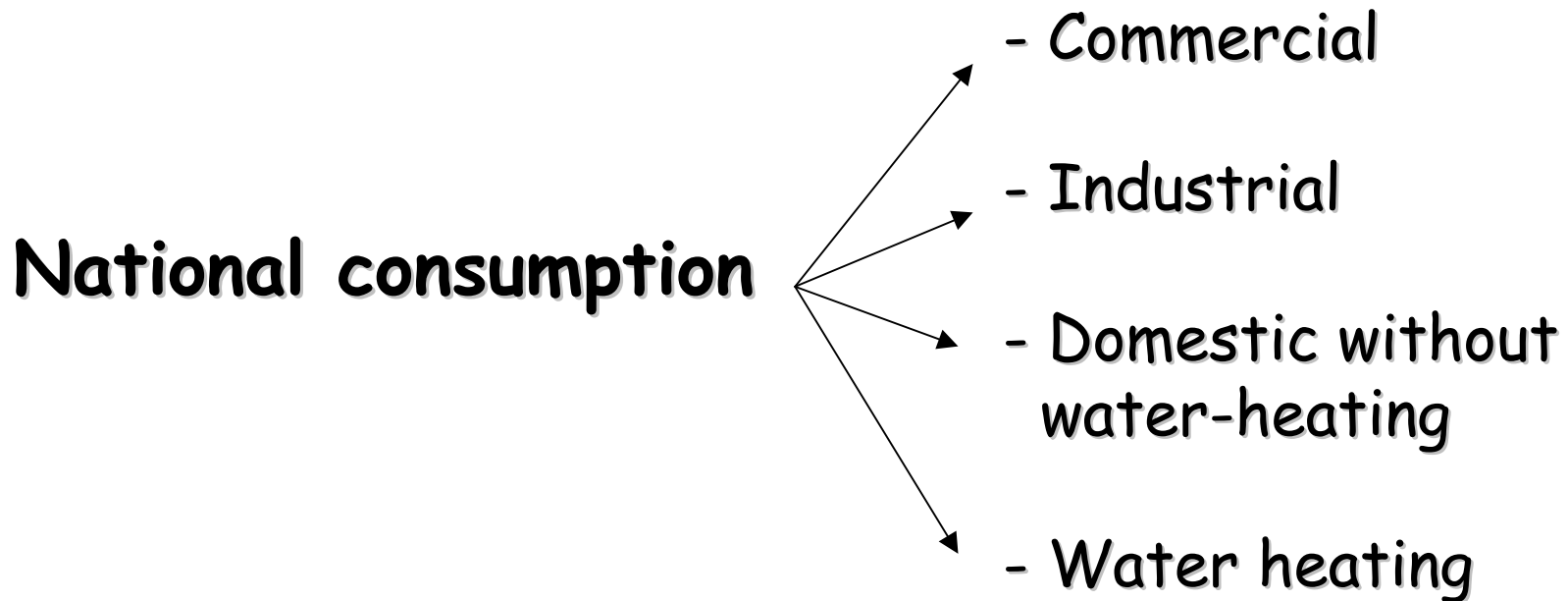
- peak hours and little premium*
- peak and off-peak hours and high premium*

*Suppression of the « Off-peak hours »*

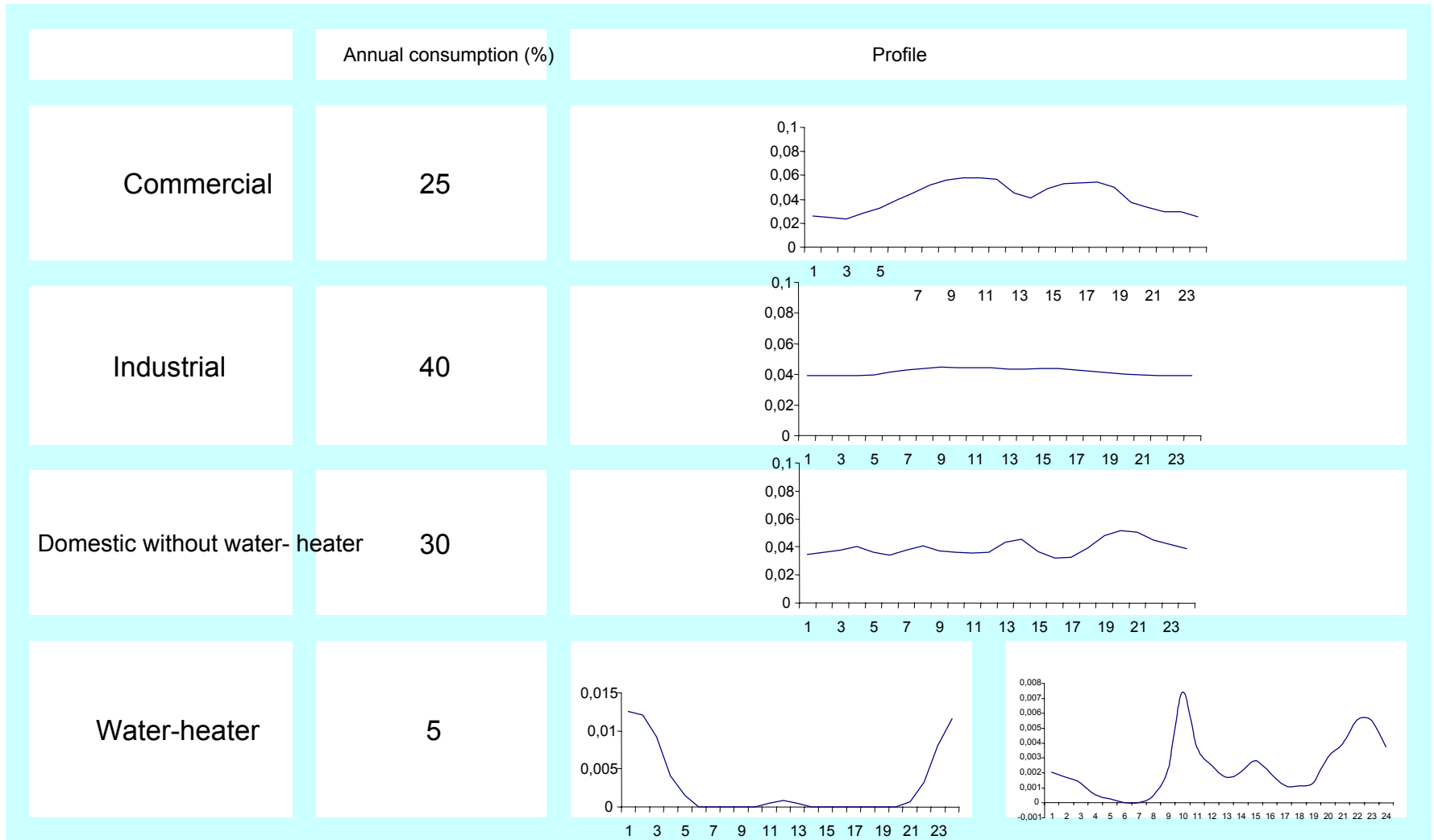
*=> a new profile for the end-use « water-heater »*

# *A simulation load curve model*

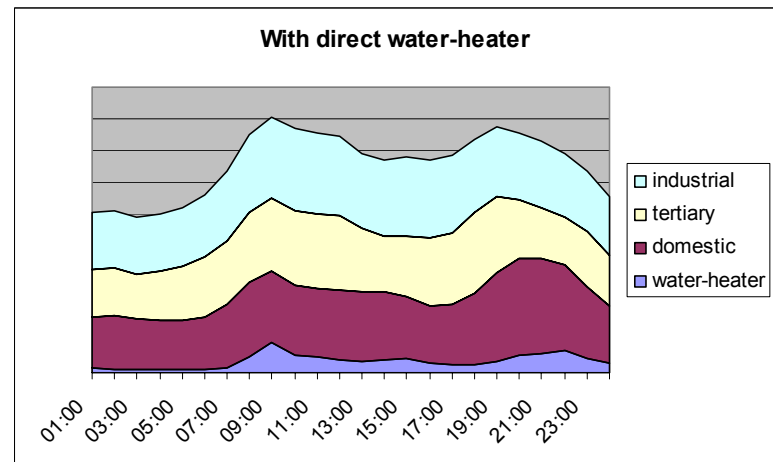
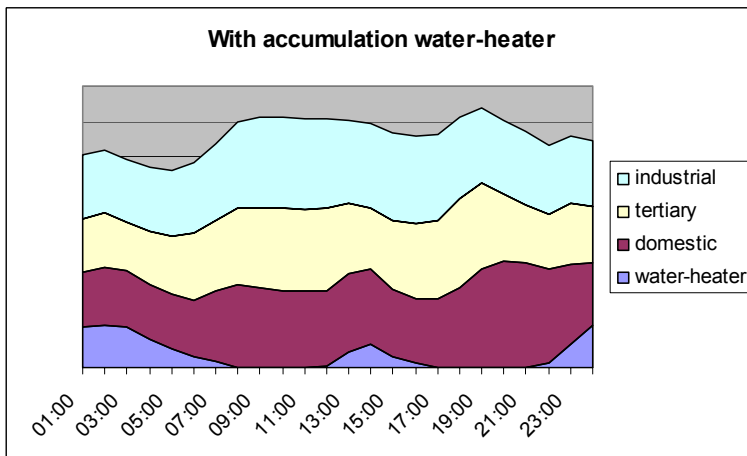
## Modelisation



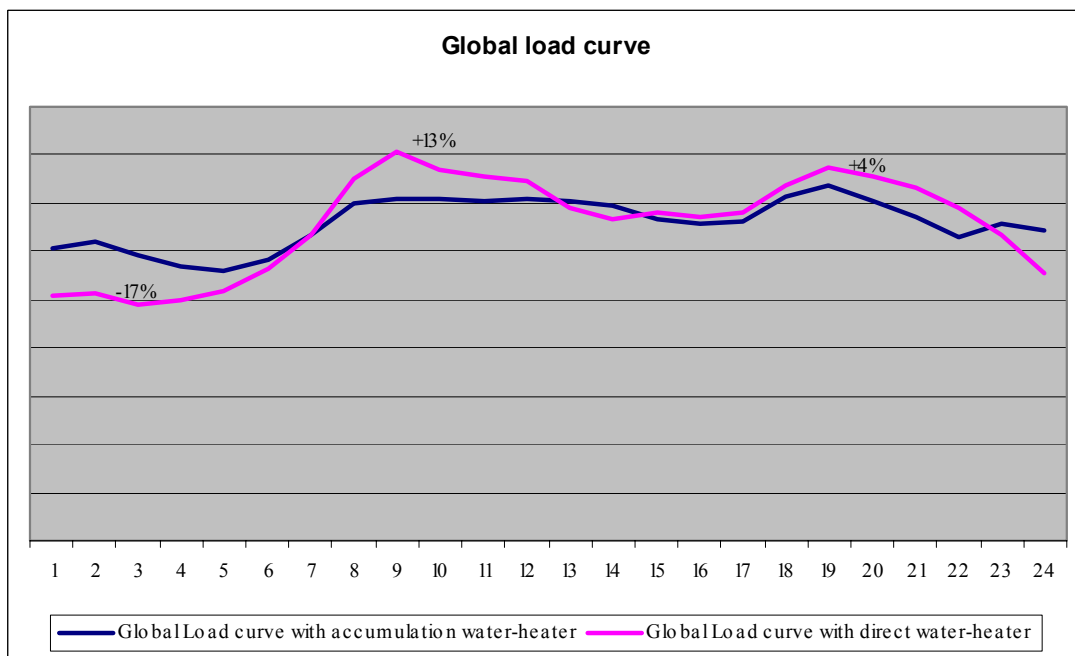
# A simulation load curve model



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For a week day

Peak

19h=>9h

9h = + 13%

19h = + 4%

Night hours

- 15%

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