# ACER – ENTSOG
## Workshop
# Non daily metered forecast by GRDF

*12/06/2018*

# Use of load profiles by GRDF

GRDF needs a non daily-metered forecast in its allocation process :

- Each day GRDF provides TSOs with the consumptions of each supplier the day before

- For non-daily customers, this consumption is estimated by the model, depending on the calendar and weather characteristics of the day

For the allocation process, the sum of all daily and non-daily metered forecasts is then complied with the total flow measured by TSOs : the calculated coefficient is supposed to be as close as possible to 1 if the prediction models are accurate.

| DSO daily forecast | Non-daily metered + smart metered customers = forecast models | x k1 | Non-daily metered + smart metered customers = forecast models | TSO daily measures |
| | Daily measured customers | | Daily measured customers | |
| | Losses | | Losses | |
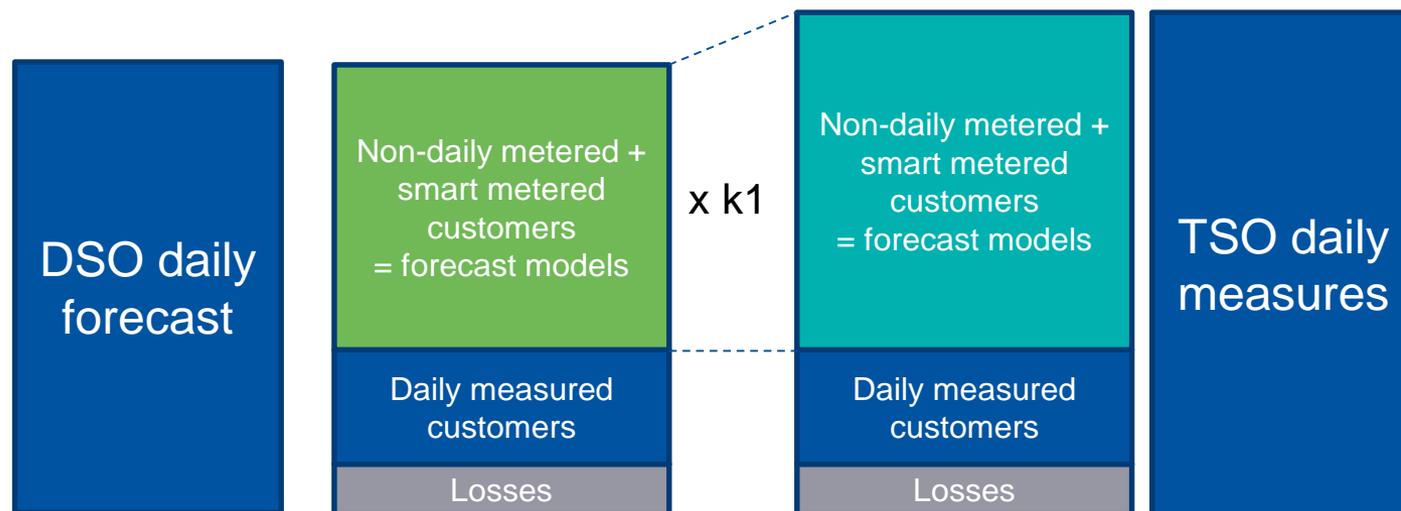
# The allocation process with the TSOs

**TSO**

**DSO**

Gas metering at the TSO delivery point (day before)

Average calorific value of the gas delivered

Daily measured consumptions (day before)

Consumption forecast for 11M customers (day before)

Intraday measured consumptions (current day)

Calculation of k1 coefficient

Sum of allocations for each shipper / delivery point (day before)

Allocation for 11M customers (day before)

TSO short term forecasts (current day and next day)

# Daily measured off-take points

Most TSO delivery points are daily measured. In case they are not, the TSO makes himself estimations of the consumptions.

GRDF has around 3500 customers equipped with daily meters (mainly the ones with more than 5 GWh/year of gas consumption : "JJ" off-take points) :

▶ Everyday the real consumption of the day before is transmitted to GRDF before 8 am

▶ For those customers, no estimation is required in the allocation process

▶ However, we define a load profile for each of them for other uses (e.g. storage capacity), or to estimate their Annual Reference Consumption.

For non-daily metered customers, the data can be collected :

▶ Each month by GSM ("MM" frequency), for about 100.000 customers (> 300 MWh/year)

▶ Twice a year with a visit of the meter ("6M" frequency) for most customers. Initially 11 million customers, their number decreases with the roll out of smart meters (currently around 10 million, less than 1 million after 2022)

▶ The new smart meters (Gazpar) transmit consumption data everyday, but they are still estimated with load profiles for the allocation process and invoicing.

# Load profiles - Principles

The Reference Annual Consumption (under average climatic conditions) and profiles are updated by GRDF once a year.

▶ Profiles represent the standard daily consumption of a customer for a certain level of temperature (representative of the average climatic conditions in the country).

## Design of Profiles

▶ Profiles try to refer to a typical gas usage like cooking, domestic hot water, heating, industrial process,…

▶ Profiles are defined on the basis of a customer panel distributed all over the country, they represent the "average" consumption in standard conditions over this panel.

▶ Profiles are submitted for approval to working groups including the Regulator, GRDF and gas suppliers

## Attribution of Load Profiles

▶ Each end-customer is attributed a specific load profile and a Reference Annual Consumption, with annual update

For non-daily metered customers, GRDF has 9 different profiles : P011 to P019

**Profile of 6M off-take points**

The roll out of 11 millions of smart meters started in 2017 and will continue until 2022.
Before that most customers were metered on a bi-annual basis (all customers whose annual consumption is below 300 MWh approximately = 99% of the customers)
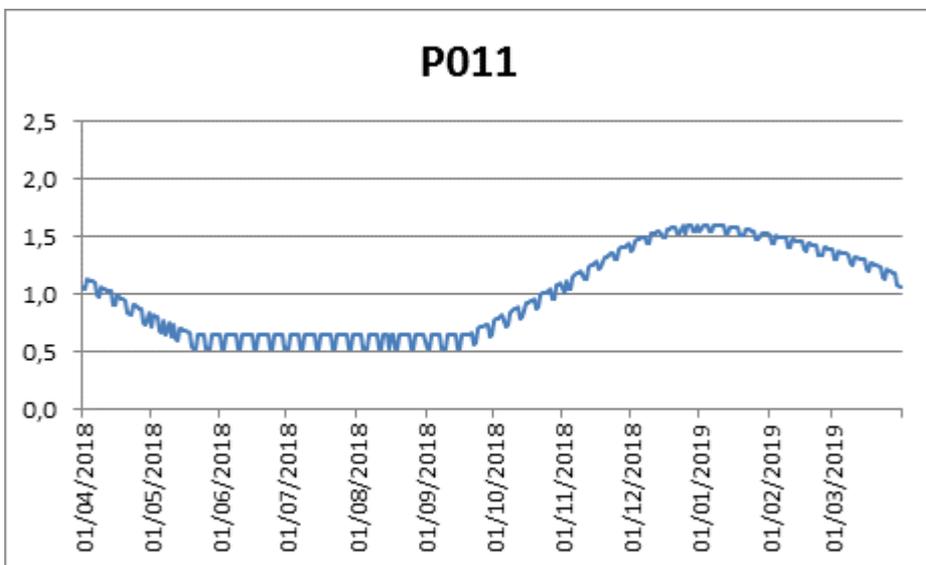


P011



P012

P011= cooking + hot domestic water usage

**Less than 6 MWh/year**

**On February 5th, the average temperature amounts 5,3°. A customer with a 365 kWh Reference Annual Consumption will consume 2 kWh.**
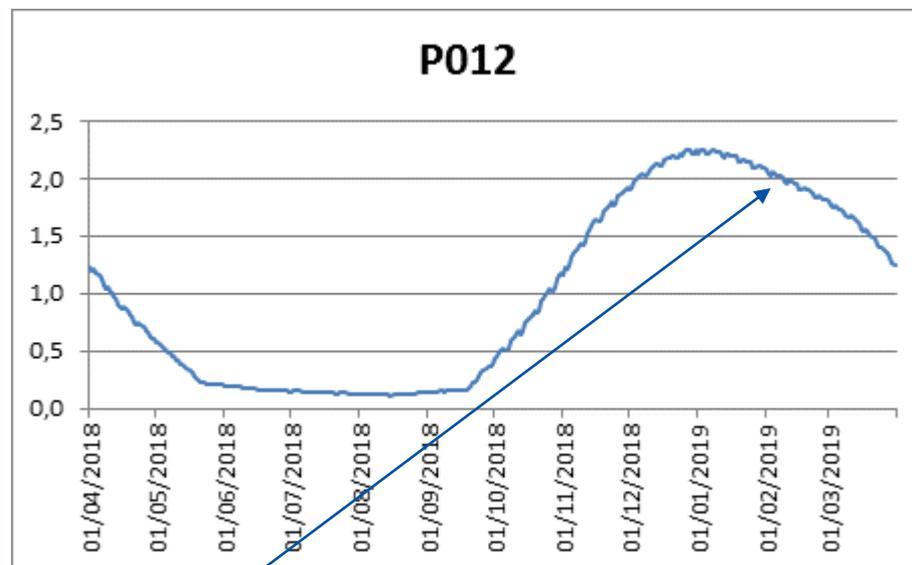
P012= heating

**More than 6 MWh/year**

**Profile of MM off-take points**

Customers whose metering is done on a monthly basis ➜ profiling is more accurate
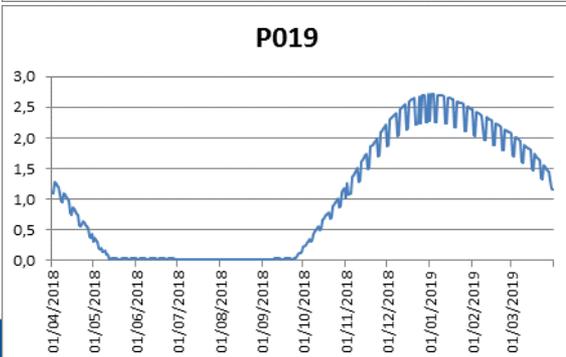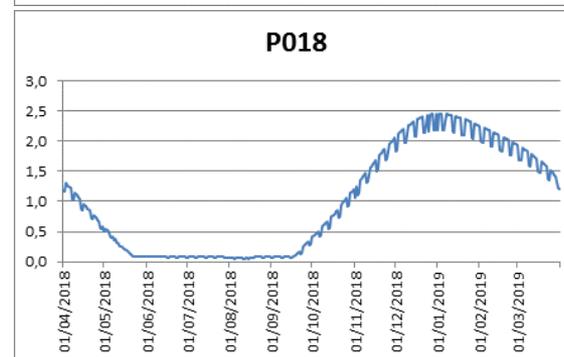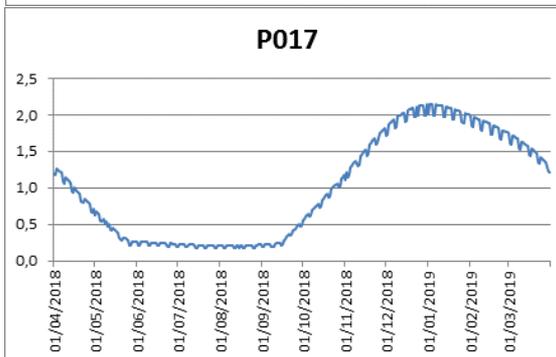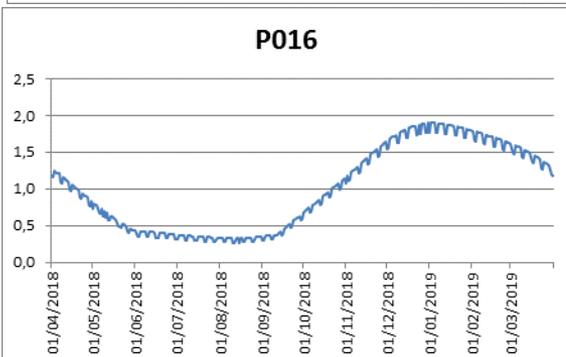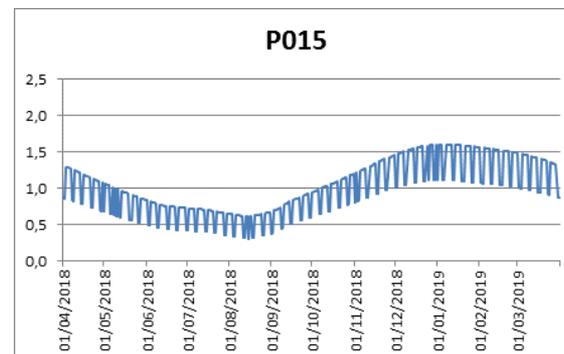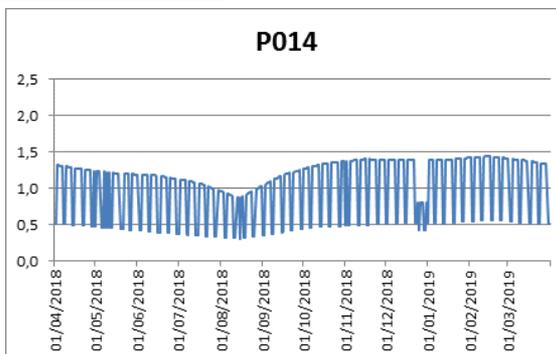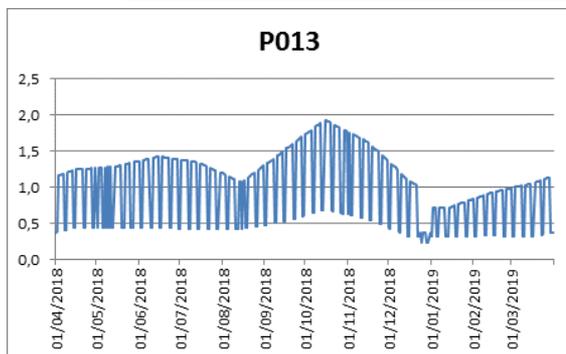


P013 to P019 : mostly tertiary, industrial clients, or collective heating systems
The profile attribution depends on the ratio = winter/annual consumption :
- P013 – P014 : industrial process (no heating)
- P015 – P016 : mixed process, including some heating
- P017 – P019 : mostly heating consumptions (very low consumption in summer)

# Daily Forecasts : general formula

For an off-take point, the daily forecast of its consumption is :

C(j) = [ Profile_coefficient (j) + Temperature adjustment ] * (Reference Annual Consumption / 365)

A few comments :

- The Reference Annual Consumption is the energy that would have been used if the climatic conditions had been close to the average in France for each day, over the past 30 years.

- Profiles shown before are defined with these temperature hypothesis (national average for each day over 30 years).
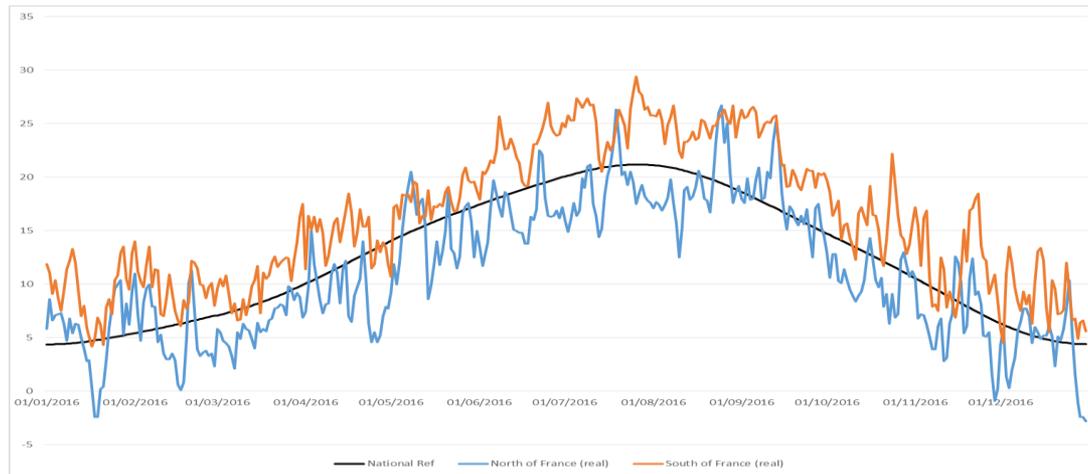


- The temperature adjustment is only effective under a certain threshold temperature for heating (around 16°C in the models).

- The temperature adjustment depends on the profile (=0 for non-climatic profiles such as P013-P014, high for profiles representing heating consumptions such as P012-P018-P019 for example)

# Daily Forecasts : load profile characteristics

- Since the climatic reference is the same all over the country, there can be a significant difference between the real and reference consumptions.

  *E.g. Customer in the south of France (Nice) with domestic heating consumption P012*

  *Real annual consumption ≈ 10 MWh (average 16,5°C)*
  *Reference Annual Consumption ≈ 15 MWh (average 12,5°C)*

- To calculate the daily estimation, we use real climatic conditions over around 30 weather stations all over the country.



  *Why 30 stations?*
  *- Historical weather stations of « Meteo France »*
  *- Precise enough given the accuracy of the models*

- The models are rather accurate in winter and summer to estimate the daily national consumption, but the error can be more important in spring or autumn, when temperatures are close to the heating threshold.

- The limited number of profiles implies that they can be inaccurate for certain type of customers (e.g. vacation homes). They are defined to be representative for the allocation process, over a huge number of customers and large geographical zones.

# Smart meters : what's next?

- Smart meters don't imply the end of load profiles : the IT systems are not designed to get every day at 6 am the daily consumption of 11 millions off-take points. Models are still necessary for the allocation process.

- Thanks to more precise consumption data (monthly invoices, daily measures), we could define profiles more accurately : we are studying new profiles that would replace the current P011-P012 (more profiles ? criteria based on their real climatic sensitivity ?...)

- The current P011-P012 are defined on a very small panel of customers (around 1000) equipped with daily metering system. We will soon have daily data for millions of customers, allowing a much more precise profile calibration process.

- On the long term, maybe we could imagine more innovative allocation models :

    - Define representative panels for each load profile, and estimate the consumption of each customer depending on the panel in similar conditions (same day / temperature / geographical zone)

    - Increase the number of daily metered end-customers in the allocation process, in priority those with atypical consumptions (badly represented by the profiles or the panel) so that they would no longer require models.