# documentation

We have done the validation for Brazilian version of COPA model using period from 2012-01-01 01:00:00 to 2012-12-31 23:00:00. The following table shows the file names and the scripts that has created it.

Table 2: File names for validation

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| --- | --- | --- |
| File type | File name | Script name |
| Hydro file | hydro\_data\_br\_2012 - only 2012 capacity.csv | Creating\_hydro\_br\_2012.R |
| Inflows | br\_shype\_hydro\_2012\_093\_adaptFactor.feather | Creating\_hydro\_br\_2012.R |
| Capacity factors wind | wind\_br.feather | Creating\_wind\_feather\_br\_2012.R |
| Capacity factors solar | solar\_GAMS\_br.feather | Creating\_solar\_feather\_br\_2012.R |
| Load | load\_Br\_2014.feather | Creating\_load\_br\_adapted\_2012.R |
| Transmission bounds | linesCapacities\_br\_2012\_1.csv | Creating\_lineCapacities\_br\_2012.R |
| Thermal Opts(capacity and VarCosts) | investOpts\_br\_thermal.sources\_1\_2012.csv | Creating\_invest\_opts\_br\_2012.R |
| Intermittent Opts(capacity and InvestCosts) | br\_intermittent\_opts\_2012\_1.csv | Creating\_intermittent\_opts\_br\_2012.R |
| Input GAMS | 20.input\_tr - 093\_adaptFactor.gdx | load\_data\_write\_gdx.R |
| Results GAMS | 20.results\_time\_resolution - 093\_adaptFactor.gdx | load\_data\_write\_gdx.R |
| Model GAMS | 20.changing\_time\_resolution - 093\_adaptFactor.gms | - |

Having this information, we are able to recreate this exercise in the future. It will be necessary when we change the time series of wind capacity factors.

# lessons

Doing this validation exercise, we conclude that our 2012 inflows has to be multiplied by a factor of 93% in order to get closer to real 2012 inflows. Actually we’ve done two calibration factors. The first one was determined by the ratio between ONS inflows sums per region and COPA inflows per region. After that, we’ve multiplied this factors by the COPA inflows.

Once we have this corrected inflows, we’ve multiplied it for the 93% calibration factor, which corresponds on difference between ONS and COPA generation in the same period and with the same sum of inflows per region.

A second lesson is that it is important to notice which thermal and hydro plants generate electricity. We’ve faced a problem, because thermal deck has a thermal plant which would be constructed. Because of that, it has no capacity and variable costs. It generates a problem on the results.

A third lesson is when we compare ONS real operation and COPA simulated operation, we expect some differences because COPA is a deterministic model. Therefore we see some differences in hydro generation mainly in the end of the year probably because we don’t deal with the hydrological uncertainties. Besides that, there are two points we don’t consider: reservoir evaporation and hourly variability of reservoir storage levels. These factors can be responsible for this 7% difference between total hydro generation from ONS and COPA on 2012.

Regarding the thermal generation, COPA’s production is constant around 170 GWh while ONS’s production increases by the end of the year because of hydrological uncertainties in terms of hydrology, demand attendance and installation of new power plants.