



CAFC IN Tall Buildings

Prepared by Patrick Brants, Lipa
Innovation

CAFC

(COMPRESSED AIR FREQUENCY CONTAINMENT)

FIRST ISSUE: CONTAINMENT OF E-GRID FLUCTUATIONS ON FCR AND AFRR MARKET CAUSED BY CONSUMERS AND RENEWABLE ENERGY

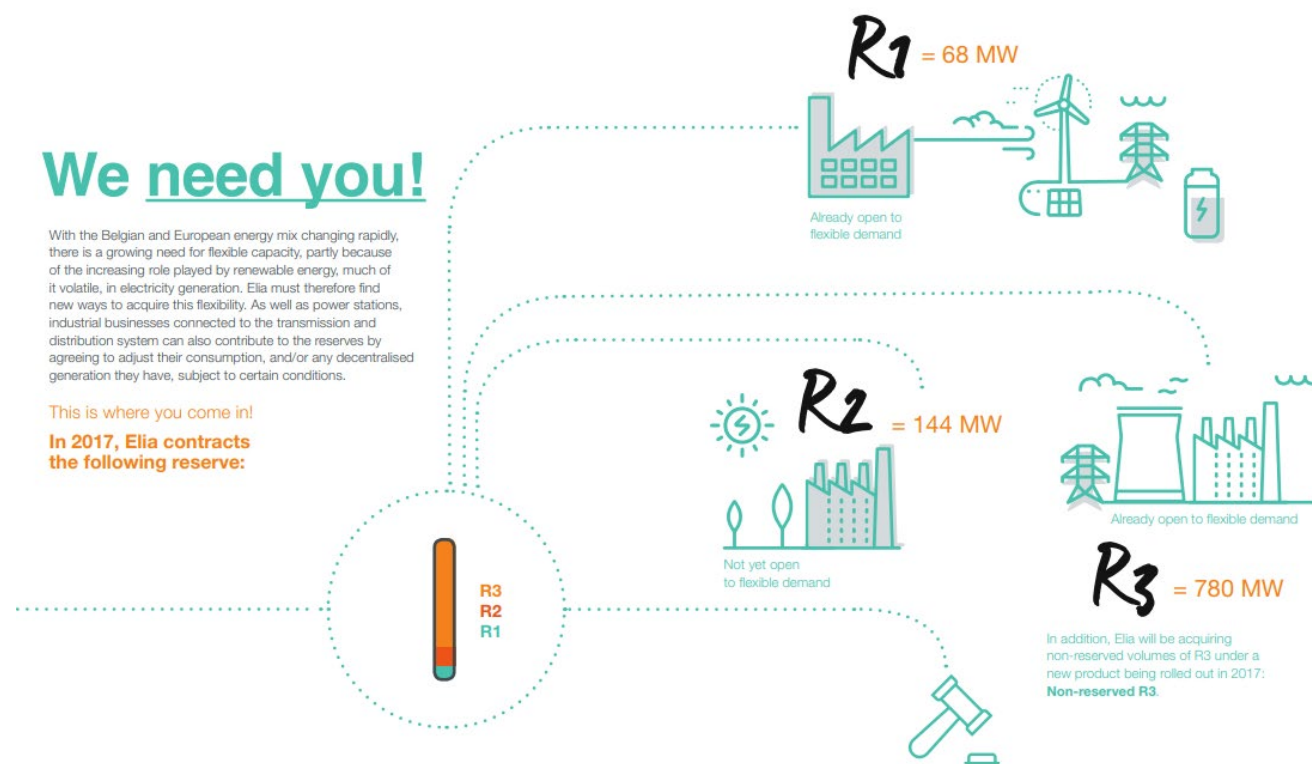
Is the fluctuation on the E-grid a problem?

We need you!

With the Belgian and European energy mix changing rapidly, there is a growing need for flexible capacity, partly because of the increasing role played by renewable energy, much of it volatile, in electricity generation. Elia must therefore find new ways to acquire this flexibility. As well as power stations, industrial businesses connected to the transmission and distribution system can also contribute to the reserves by agreeing to adjust their consumption, and/or any decentralised generation they have, subject to certain conditions.

This is where you come in!

In 2017, Elia contracts the following reserve:



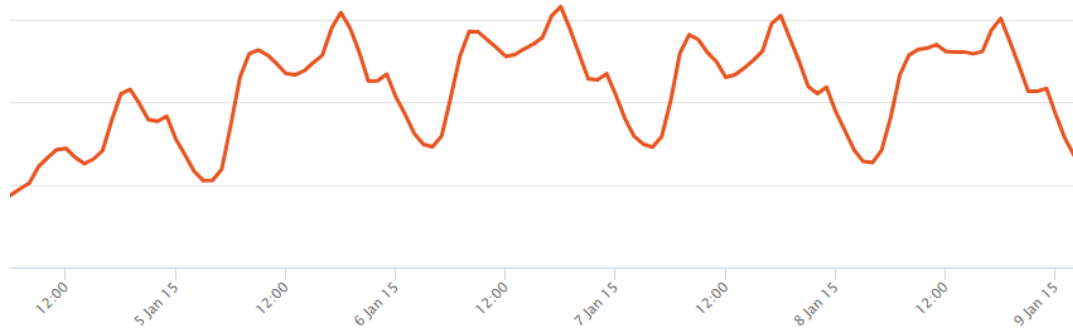
Too much wind, little consumption> we take energy from the grid and flatten out on the FCR market

- ▶ the CAFC genset can respond to the grid frequency within 30 seconds on the on grid frequency! In the period of excess energy, we are negatively balanced, so if we take 1kW from the grid we supply maximum 0.5kW and usually less so that energy is stored.



Consumption peak in morning and evening, injection into aFRR market

- the CAES compressor switches off and the genset briefly gives energy to the electricity grid idem gas power plants.



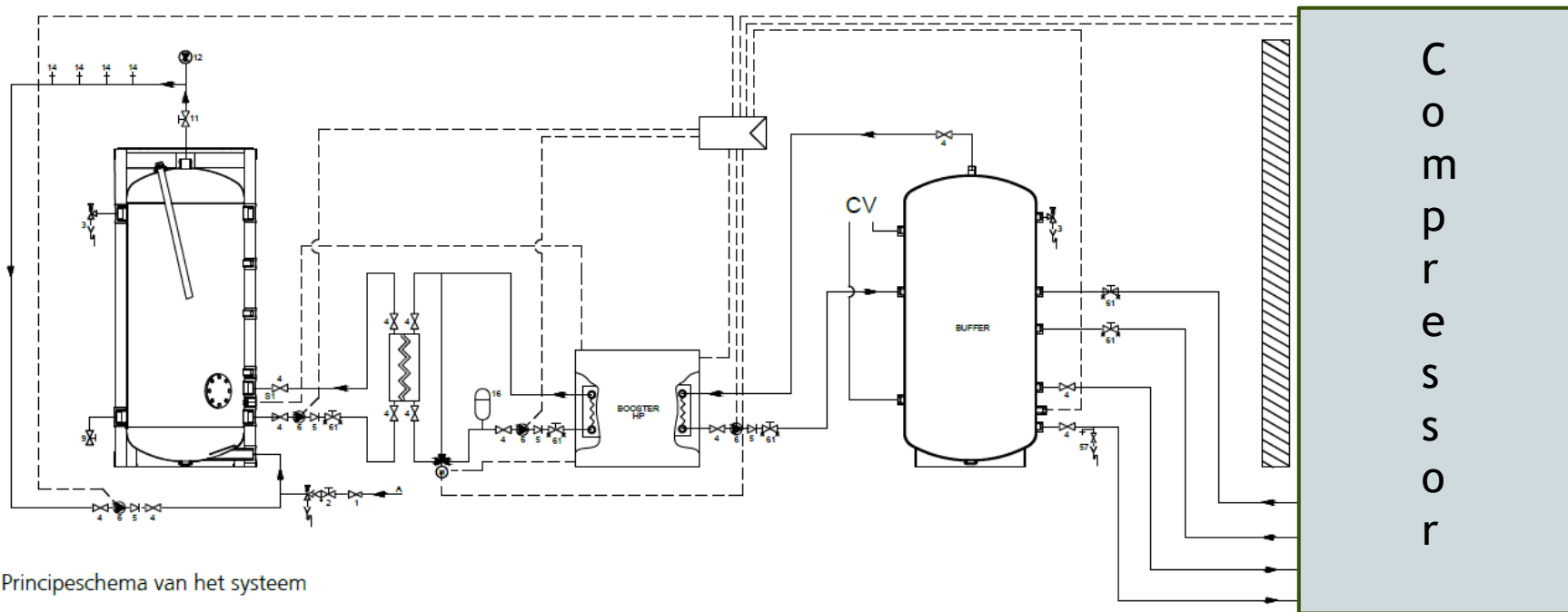
SECOND ISSUE: switching off gas in public high rise buildings, swimming pools, etc

- High rise buildings, public swimming pools, etc need water of 50°C to 80°C. Gas boilers are then very interesting but not ecological!



Optimise COP heat pump in swimming pools

- heat pump comes behind the compressor and delivers a temperature jump of max 25K resulting in a very high COP.



Principeschema van het systeem

Compressor

- The compressor takes electricity from the grid when there are no consumer peaks and is cooled via the booster heat pump at low and medium temperatures. As the compressor is under the pool, the residual heat also heats the pool water. No heat from the compressor goes to waste! CAES delivers 50% to 60% of its power back to the grid and, on top of that, 100% of its energy becomes heat and afterwards you get the same amount of energy in the form of cold air. Running hours when there is a lot of wind autumn-winter-spring and occasionally in summer.



BK 26.x



Generator

- Fast and powerfull injector into the grid for supporting surges on the grid in short and medium wave. Very simple technology and long service life!



IS it possible to implement in highrise buildings,Swimming Pools,etc

- ▶ YES even in existing buildings!
- ▶ space for set-up in basement is always possible and this buildings are located in cities where there are consumption peaks.
- ▶ One can easily install in the basement and connect to existing HVAC installations.
- ▶ For high rise buildings one can easily implement a cold storage system
- ▶ Pools need heat all year round and of course mainly in winter when there are more peaks of wind on the electricity grid!
- ▶ High-rise buildings need continuous heating and cooling, and this innovative system optimises even existing heat pump systems.

Is there a payback model?

- ▶ YES, current software models on the power grid, allow allowances to be made for accommodating short power peaks. This combined with the gains on heat and cooling requirements in large buildings, there is a faster payback time than other heat generation systems.