



## Black Start: production units dedicated to restarting the grid

In the event of a full blackout<sup>1</sup> of its grid and unavailability of neighbouring systems, Elia has to set in motion a procedure aimed at gradually restoring power. To do this, Elia relies on a number of production units providing a so-called "Black Start" service, i.e. units that are capable of starting up without any external input of electricity and of gradually restoring power to grid users. This service is the subject of a contract and is paid for by Elia.

### I. Black Start service: principles

In case of blackout, Elia must be able to rely on the resumption of power production and the gradual restoration of its high-voltage network. Such measures can be swiftly and efficiently taken if a Black Start service is placed at Elia's disposal by the users of the high-voltage grid. These grid users must dispose of production units that comply with some specific technical requirements. Belgium's economy must indeed be able to rely on swift restoration of power supply from the grid: a slow reaction time could result in power outages for vital elements of the Belgian socio-economic life such as hospitals, means of communication, and so on.

In the event of a grid blackout, the production units offering the Black Start service start up without any input from the high-voltage network. The restoration of these units and their ability to restore a grid that is being reconstructed make it possible to gradually include other production units in the grid, ultimately leading to the grid's full restoration.

### II. Specific and designated production units

#### II.1. Starting up without a power grid

In addition to needing fuel, production units need energy to ensure their start-up. One simple way of acquiring such energy is to call on power grids in the immediate vicinity of the respective production unit. However, this simple and relatively inexpensive approach is not available in the event of a blackout as, in such case, power on the grid will be cut.

#### II.2. An auxiliary generator to restart power production and restore the grid

In order to enable start-up in the event of a blackout, some production units are equipped with an emergency power source comprising one or more auxiliary generators, which enable the production unit's vital functions to be preserved in case of a major problem on the grid. Such generators – which are usually diesel-powered or gas-powered – are sufficiently powerful to guarantee that the unit will start up without the help of an external feed. It is this type of production unit that can take part in the Black Start service. Once the generators have enabled the main production unit to start up again, it will be able to supply power to part of the neighbouring grid and provide electricity to other units in the vicinity, enabling them in turn to power up.

#### II.3. Selection based on performance, location and price offer

Besides the need for suitable generators, the location of a production unit is an important criterion enabling it to offer a Black Start service. To reconstruct its grid, Elia needs production units at key locations. The presence of a production unit providing the Black Start service in a strategic part of the grid facilitates the grid's restoration.

Elia also takes the producers' price offers into account and privileges the most favourable.

#### II.4. Minimum technical requirements for providing the Black Start service

For obvious reasons to do with reliability, the production units providing the Black Start service, need to meet certain technical requirements:

- be capable of starting up without using an auxiliary source of power derived from high-, medium- or low-voltage networks;
- be capable of responding swiftly and dynamically to load fluctuations up to 10 MW;
- be equipped with a regulator enabling rotation speed to be geared to the frequency required by Elia's dispatching department. This is essential if the production unit in question is to be reconnected to the remainder of the grid as soon as it is up and running again;

<sup>1</sup> A blackout is a situation in which a region finds itself without electricity following a series of unforeseeable events triggering the consecutive loss of grid elements and production units, whereby the grid is said to "exceed its operational limits".

- have synchronisation equipment enabling voltage to be restored to a substation without power;
- be capable of feeding power into the grid:
  - within three hours following the blackout for units in operation at that time;
  - within five hours following the blackout for units in shut-down;
  - for a period of at least 12 hours.

When selecting production units to offer Black Start services, special attention is also paid to:

- redundancy of the elements required to restore power via the grid (to prevent so-called "common mode failures");
- the availability of a sufficient number of suitably trained staff to start up the unit in Black Start mode and run the production unit whilst the grid is being restored.

Elia regularly checks the operational capacity of the production units contracted to provide the Black Start service, organising real start-up tests under Black Start conditions.

### III. Benefits to the provider of the Black Start service

The investment costs incurred in order to meet the technical requirements of Black Start service are covered by a contractually fixed retribution. The Black Start contract may cover several years, during which that retribution will be allowed. In addition to that financial benefit, the producer involved in a Black Start scenario will have power restored faster than other grid users in the event of a blackout and will thus have the opportunity of starting up its industrial processes sooner.

The procedures associated with the Black Start service necessitate close co-operation between the power producer's personnel and Elia's various departments. This improves mutual awareness of the needs and possible performance of each other and contributes to better technical training of the staff involved, which can be a major asset when dealing with various kinds of incident or unforeseen circumstances.

### IV. Legal and contractual basis

Under the federal Grid Code, Elia is legally bound to conclude Black Start service contracts with a view to ensuring that the grid can always be restored in the event of a blackout. The provider of the Black Start service and Elia are contractually bound for one or more years. This contract can only be concluded if the production units in question are targeted by a CIPU contract concluded with Elia (consult sheet: "The CIPU contract: a set framework for taking part in the high-voltage grid management").

## Black Start service in 5 key points

- The Black Start service enables the grid to be restored swiftly in the event of a blackout.
- The production units providing Black Start service are equipped with a system that enables them to power up independently of any external electric grid.
- The Black Start service is paid for via a contract that may cover several years. As well as the benefit of such a payment, the producer will be able to start up its industrial processes again more rapidly.
- The location of production units, the speed of start-up and the availability of trained personnel are the main criteria based on which Elia contracts out Black Start services.
- Black Start services are the result of a legal obligation stipulated in the federal Grid Code.