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Positive Energy

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Frequency Response

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1.0 Introduction

The National Grid has two main roles:

1. To move electricity from where it is generated to where it is demanded
2. To ensure that there is enough power in the system for when it is demanded.

To do this is it is critical that they balance system. The grid has to operate in a frequency of between 49.8Hz and 50.2Hz. Outside of these range you get issues with power supply and if it drops below 49.2Hz you get blackouts in the system. The lowest that the National Grid has ever dropped is 48.8Hz at which point over 600,000 residential properties lost power. Historically these issues have occurred when a large power station has failed unexpectedly.

The changing profile of electricity being put into the grid through the increased amount of renewables, particularly wind and solar, is making balancing the grid more challenging.

2.0 Balancing the Grid

Balancing is done in a four hour cycle. Major power stations are required four hours in advance to say what power they will be able to supply.

This is coupled with National Grid predictions of demand and if they feel that the supply will be short they will "buy" more power by asking other suppliers to come on line and provide power. This can be in the format of systems such as generators or batteries or asking a large power station to turn up its supply.

3.0 Frequency Response

The critical part to maintain the grid in power and have sufficient power in the grid is through frequency response; this happens in two ways:

A. Dynamic Response
   All large power stations of more than 50MW of generation capacity have to participate in this dynamic response. In normal operations these power station all run at less than their maximum output so they have headroom to turn up their supply and also foot-room to decrease their supply. Therefore the large power stations are all on permanent notice to react to the National Grid's requirement. They get paid to provide this service through a monthly auction.

B. Firm Frequency Response
   This can be static or dynamic. In a dynamic situation it is similar to the large power stations providing dynamic response but is available to operators of smaller systems who sign up to a contract.

   Under the static system either a large user such as an aluminium smelter or a small generator such as those operating diesel, gas or battery generator sets are connected to the grid through a remote sensor system. This reads the grid and kicks in within 30 seconds if the frequency reduces below 49.6Hz. A higher payment rate is available to those that can respond in less than 10 seconds. Once you are connected in you have to be available for 30 minutes.

   For firm frequency response there are monthly auctions. Under these you specify your availability for a minimum of 1 hour per day to 24 hours per day and how long you are willing to offer your price for

whether it is a month or up to 2 years. Therefore you know how much you have to operate for in any 24 hour period (critical for fuel supply for diesel generators or battery discharge and recharge cycles for example) and how long you have agreed a price for and to be available for.

4.0 Other Payment Schemes

Those operating under Frequency Response can also participate in STOR, the capacity market and TRIAD. Depending upon your technology and your ability to operate you can therefore combine up to all four schemes to produce revenue.