

**Be the
source**

Balancing Supply and Demand



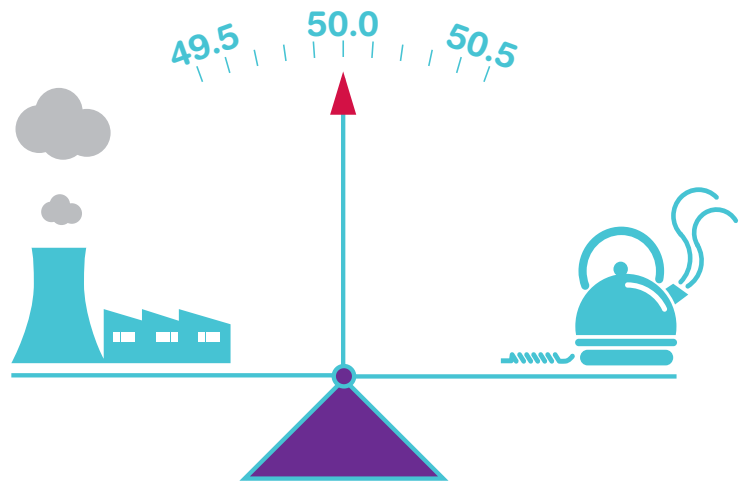
The Balancing Act Supply and Demand

50Hz
normal operating frequency

Electricity cannot be stored, it has to be generated at the time it needs to be used.

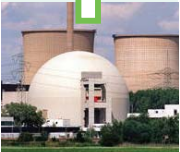






In Britain, it is National Grid's job to balance the supply and demand of electricity, second by second, minute by minute, hour by hour, day by day. Electricity must be delivered at a frequency of 50Hz, with serious consequences if it is too high or too low.

We plan for every event that might impact the electricity you use. Some of these events are easier to predict than others; examples include a solar eclipse, a TV pick up or Royal Wedding. Less predictable can be a sudden loss of supply.



Managing the System – Forward Planning

Each different source of energy has a different start up time, reliability and cost; they also have a different carbon impact. The most flexible generation is Pumped Storage (Hydro). From here electricity is generated quickly but this is limited so has to be used along with Coal and Gas fired power stations. The least flexible is Nuclear and the least predictable is Wind.

5 gCO ₂ eq/kWh	1000 gCO ₂ eq/kWh	650 gCO ₂ eq/kWh	500 gCO ₂ eq/kWh	1000 gCO ₂ eq/kWh	10 gCO ₂ eq/kWh	5 gCO ₂ eq/kWh
Nuclear	Coal Fired	Oil Fired	CCGT	Gas Turbines	Hydro	Wind
48 hours	6 hours	12 hours	6 hours	2 minutes	10 seconds	N/A
						

The Royal Wedding – the peak of demand



Demand surge during the Royal Wedding equivalent to almost

1 million kettles

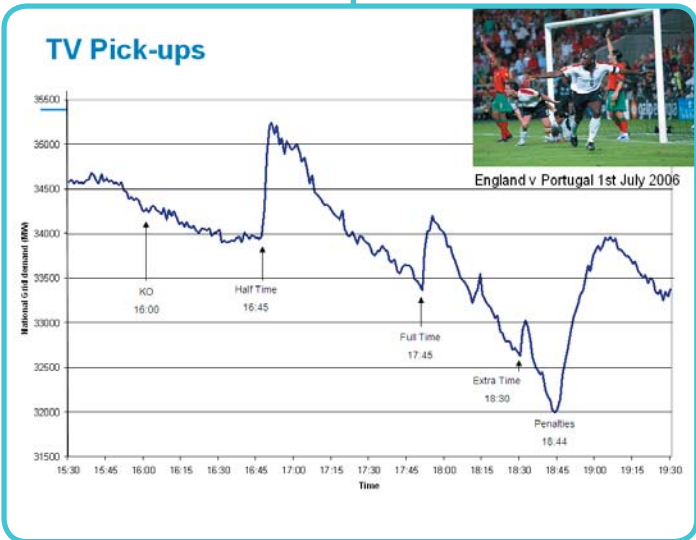
For major national events, our forecasting teams have a huge responsibility.

Planning for the energy needed during the Royal Wedding of Prince William and Catherine Middleton began as soon as the engagement was announced. We have to predict the peaks of demand, to make sure the entire system is balanced – that is that the supply matches demand.

To do this we look at data from previous events, looking for those that took place on similar days and at similar times. However, every event is different, societal and behavioural trends have to be taken into account as do technological changes. So the forecasting team have to “mix and match” data from different sources.

On the big day people relied on electricity to broadcast the celebrations live to an audience of billions worldwide. At 12:40 after the ceremony and before the excitement of the kiss on the balcony, the British people took a break from their TV viewing and turned to activities that used more electricity. Demand surged by 2,400 megawatts – the equivalent of almost one million kettles being switched on at the same time.

Our next challenge is to predict the electricity demand and the surges that will happen at the London Olympics, our engineers are looking forward to the challenge.



Top 10 TV Pick-Ups

Date	Event	Pick-Up (MW)	How many kettles?	1 in X Households
04/07/1990	WC Semi-Final (West Germany v England)	2800	1.12m	1 in 22
22/01/1984	The Thorn Birds	2600	1.04m	1 in 24
21/6/2002	WC (England v Brazil)	2570	1.03m	1 in 24
12/6/2002	WC (Nigeria v England)	2340	0.94m	1 in 27
29/04/2011	Royal Wedding	2300	0.94m	1 in 27
05/04/2001	EastEnders (who shot Phil Mitchell)	2290	0.92m	1 in 27
08/05/1985	Dallas (who shot JR)	2200	0.88m	1 in 28
20/04/1991	The Darlings Buds of May	2200	0.88m	1 in 28
22/11/2003	Rugby WC Final (England v Australia)	2110	0.84m	1 in 30
18/04/1994	Coronation Street (1hr special)	2100	0.84m	1 in 30



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Securing our energy supply for future generations