

Future Energy Scenarios

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Agenda















- **Current provisions for system balancing**
- **Future challenges for system balancing**
- **Modelling demand profiles**

Current provisions for system balancing

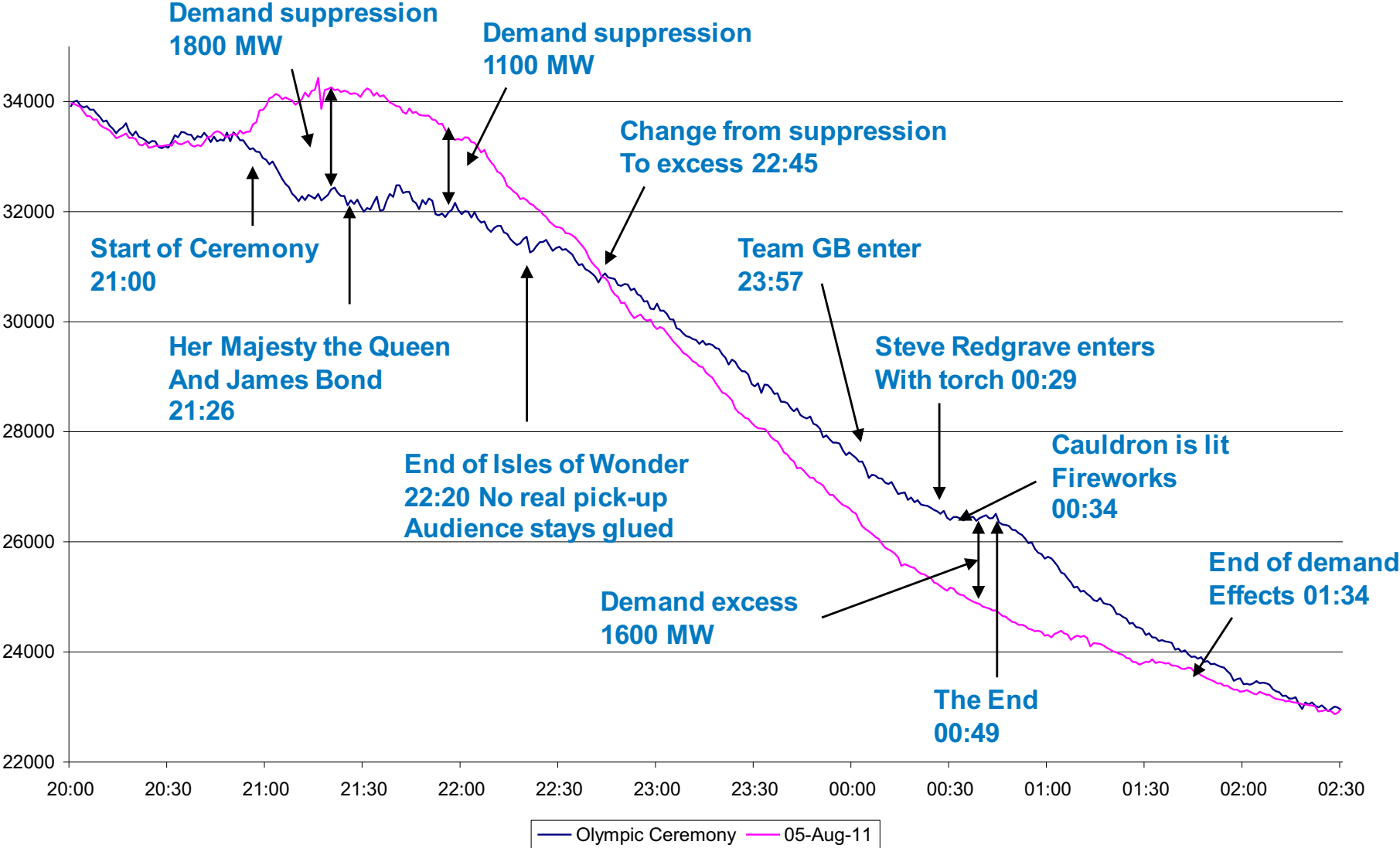
“Balancing generation and demand second by second and Keeping the frequency at 50Hz”

Balancing Services	Ancillary Services	System Ancillary Services	“Part 1 System Ancillary Services” or “Mandatory Ancillary Services”	Mandatory Frequency Response
				Obligatory Reactive Power Service
			Part 2 System Ancillary Services	Fast Start
		Black Start		
		System to Generator Operational Intertripping		
		Commercial Ancillary Services	BM Start-Up	
			Short Term Operating Reserve (STOR)	
			Fast Reserve	
			Firm Frequency Response (FFR)	
			Frequency Control by Demand Management (FCDM)	
			Commercial Intertrip Services	
			Enhanced / Commercial Reactive Power Service	
			Transmission Constraint Agreement	
	SO to SO Service			
	Maximum Generation			
Generation Curtailment Service				
Balancing Mechanism	Balancing Mechanism Bids and Offers			
	Pre-Gate Balancing Mechanism Transactions (PGBTs)			

Changing demand the weather

Weather Effect	Demand Effect	Generating Units (500 MW)
 <p>Temperature (1° C fall in freezing conditions)</p>	+ 1 %	
 <p>Wind (10 mph rise in freezing conditions)</p>	+ 2 %	 
 <p>Cloud cover (clear sky to thick cloud)</p>	+3 %	  
 <p>Precipitation (no rain to heavy rain)</p>	+ 2 %	 
 <p>Temperature (1° C rise in hot conditions)</p>	+ 1 %	

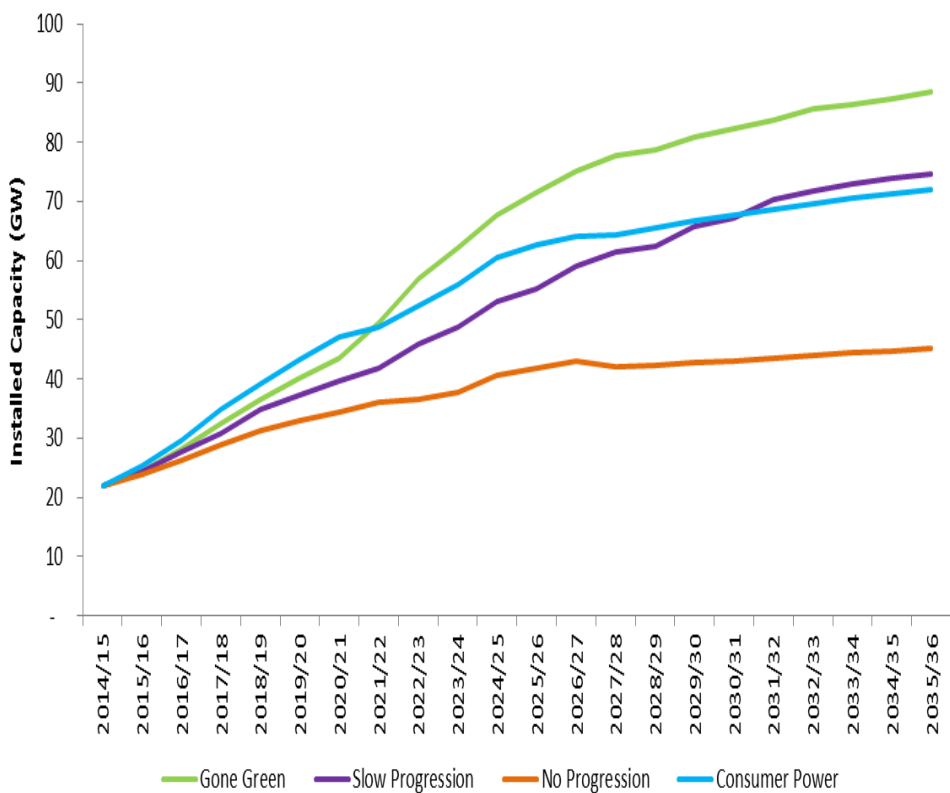
Changing demand behaviours



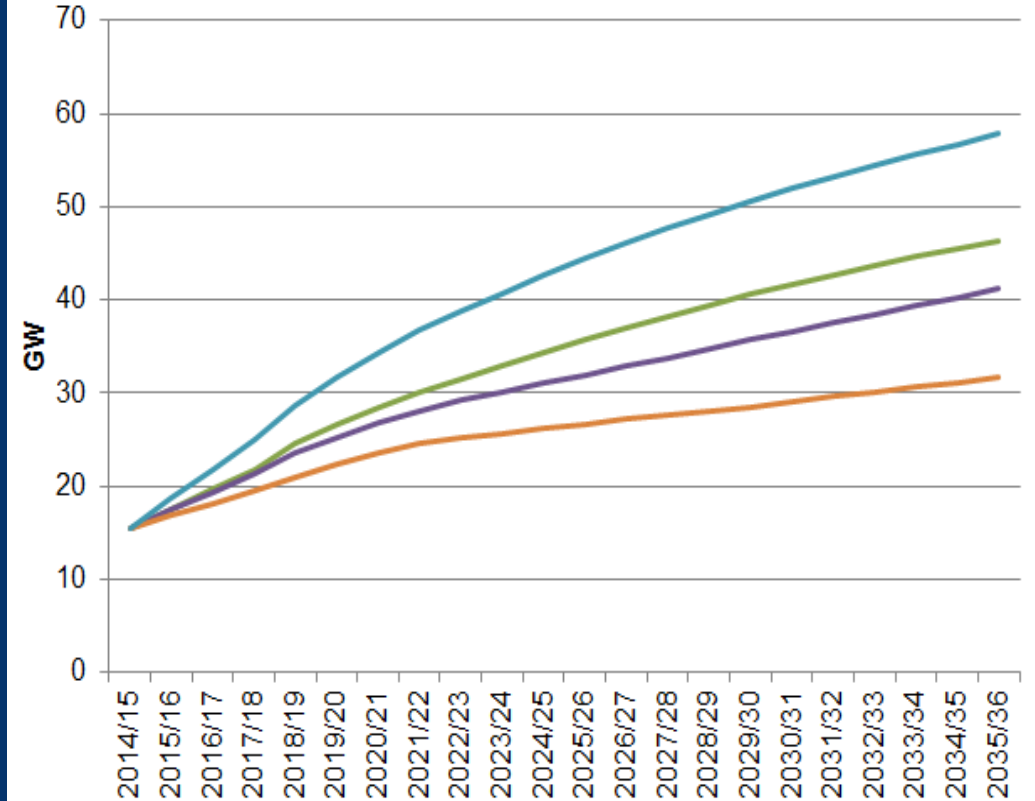
Future challenges for system balancing

We have seen weather as a challenge to balancing; this will increase as weather effects generation as well as demand:

Renewable Capacity



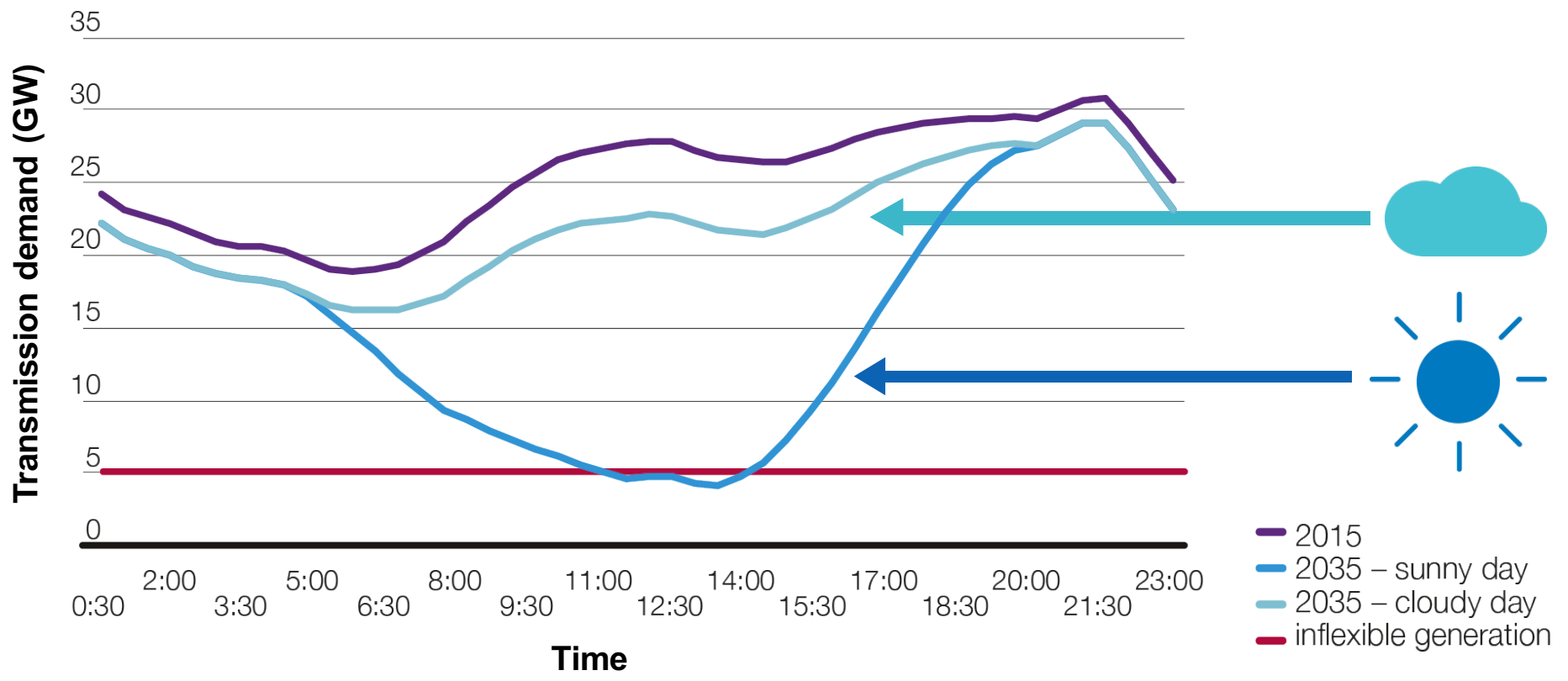
Distributed Capacity



Future challenges for system balancing

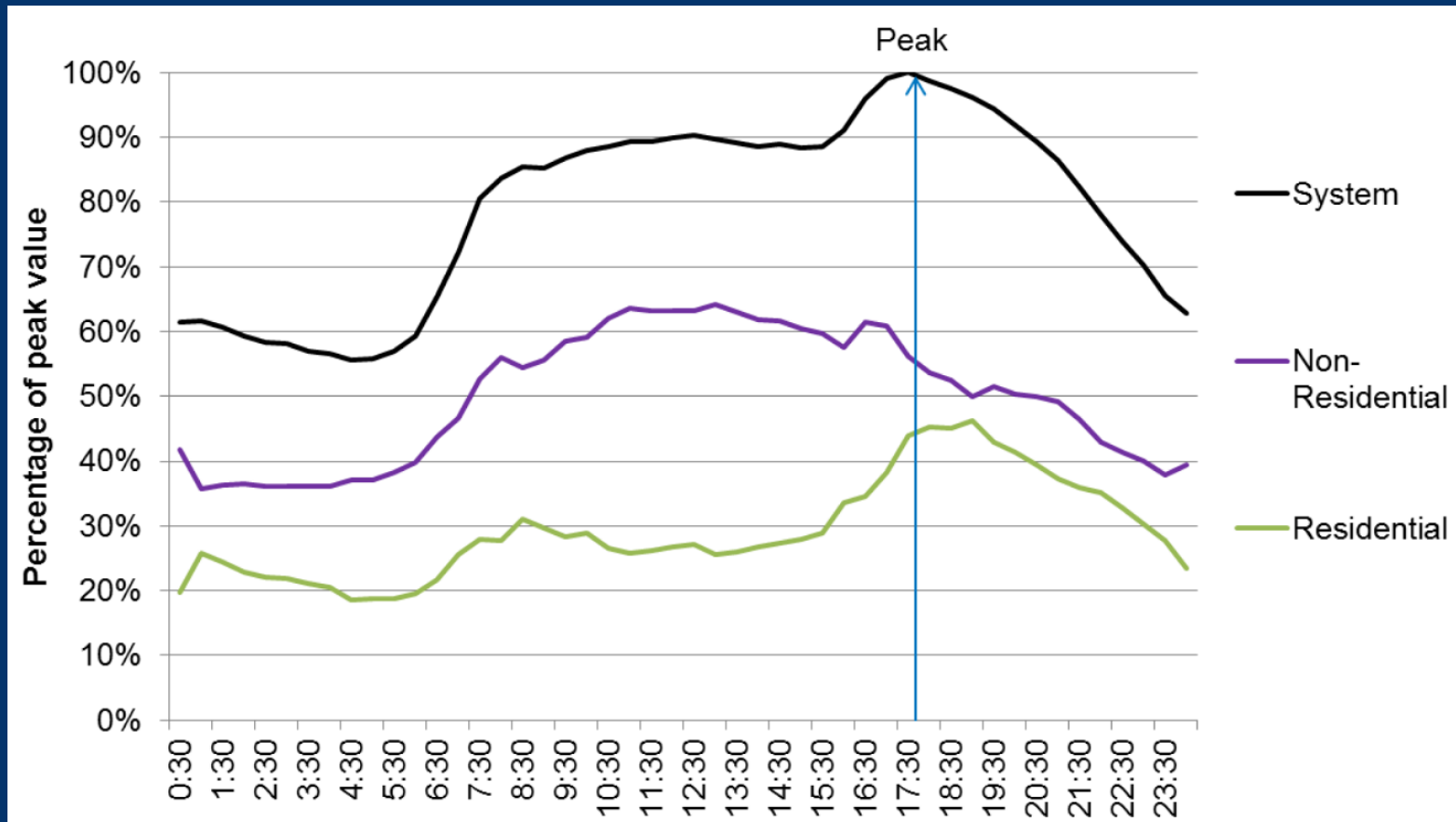


Summer minimum demand



Modelling Demand Profiles

Historically have prioritised peak demand for network design purposes. Increasing focus on minimum demands and other times of the year:



Modelling Demand Profiles

In order to model demand profiles in the future an understanding of the following is required:

- **“New” technologies**
 - **Electric vehicles**
 - **Low Carbon heating**
 - **Smart meters / appliances**
 - **Self generation**
 - **Storage**
- **Peoples changing behaviours....**