

## Improved PV & Embedded Forecasting



**Jeremy Caplin - Energy Forecasting Manager**

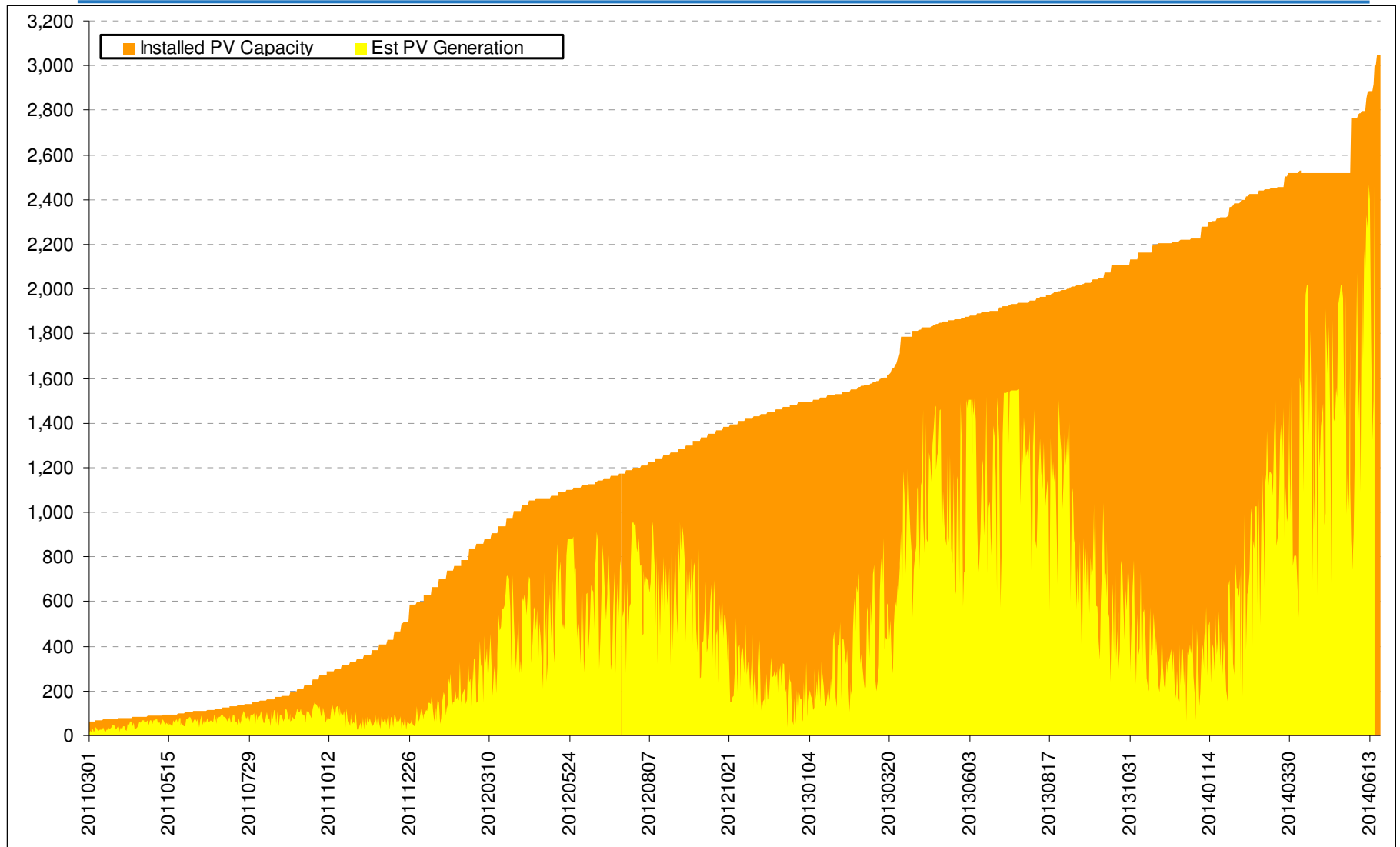
## Improved PV & Embedded Forecasting

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- National Grid estimate of PV Capacity taken from DECC website passed 3 GW last week (Fri 20<sup>th</sup> June )
- National Grid forecasts embedded PV generation in order to forecast net Transmission System Demand
- Several Customers have asked National Grid to publish these forecasts
- National Grid has responded to these requests, and have also updated other data on our website

# Forecasting Solar Generation – Estimated PV Capacity to 20 June 2014

nationalgrid



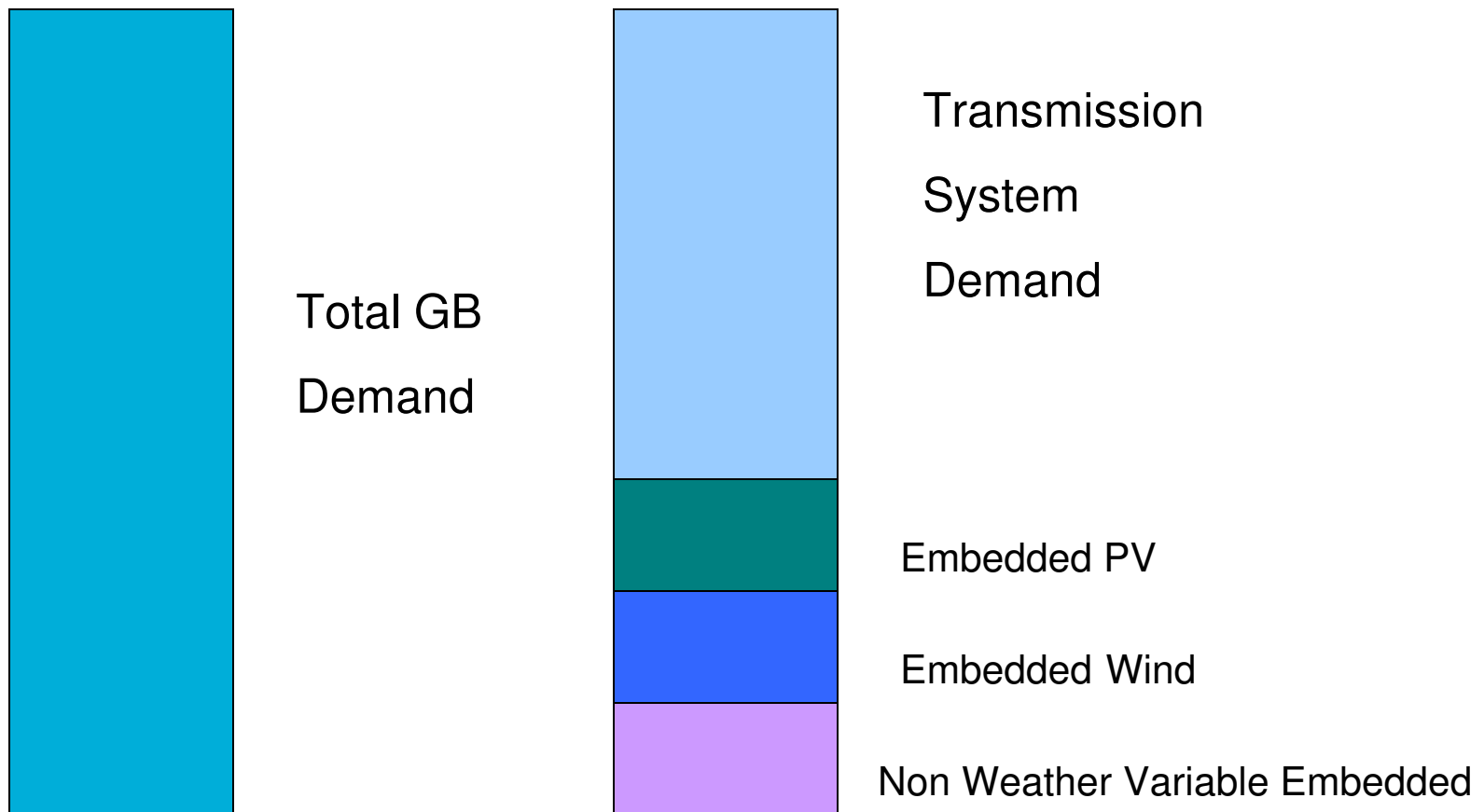
## Forecasting Solar Generation

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- National Grid does not receive data on PV installations
- Forecasts based on capacity derived from DECC data on FIT and ROCs
- Capacity likely to be underestimated due to inherent lag between new installations going live and payment data appearing on DECC website
- National Grid does not currently receive metering from any PV installations – model tuned to minimise demand forecast error

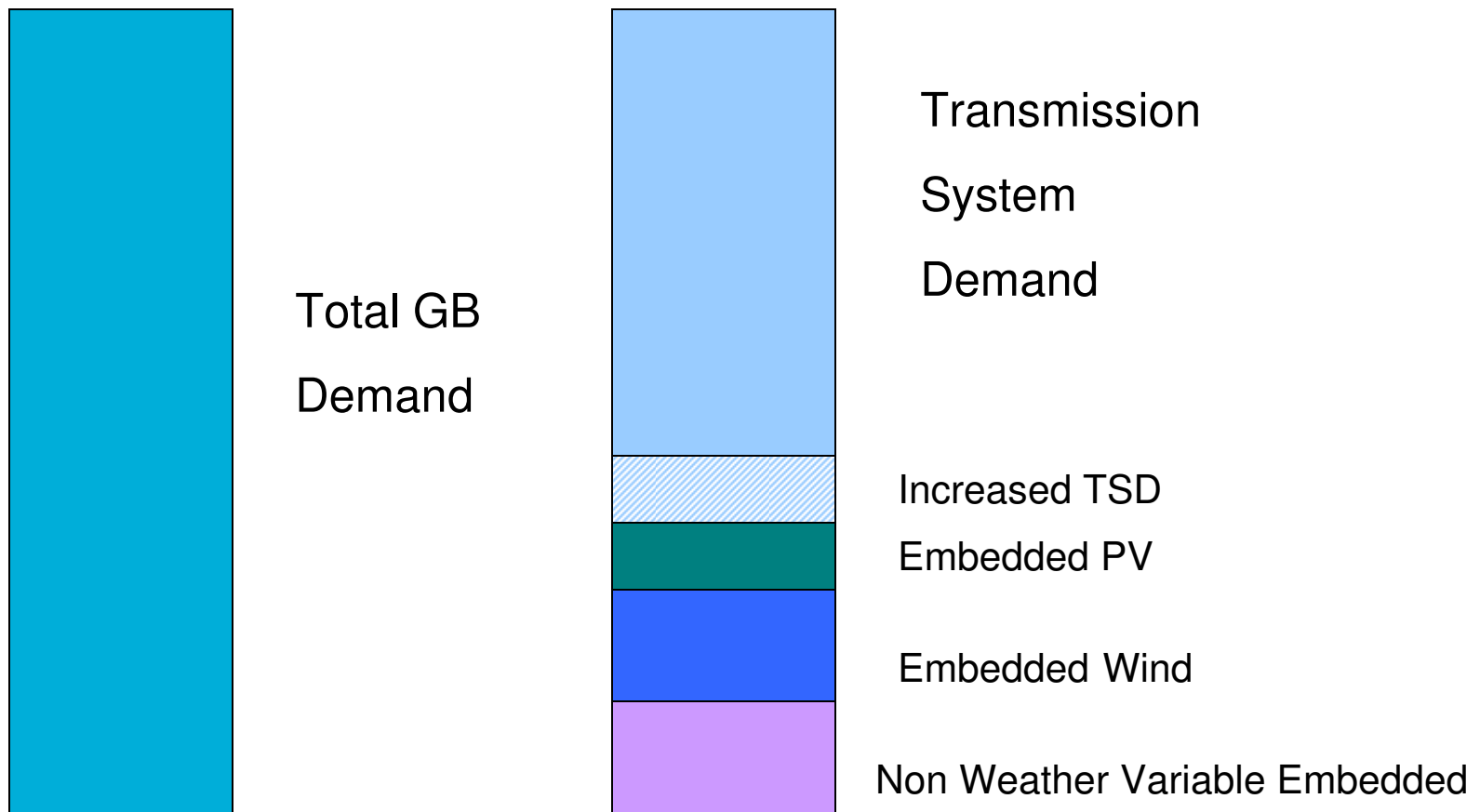
# Forecasting Solar Generation

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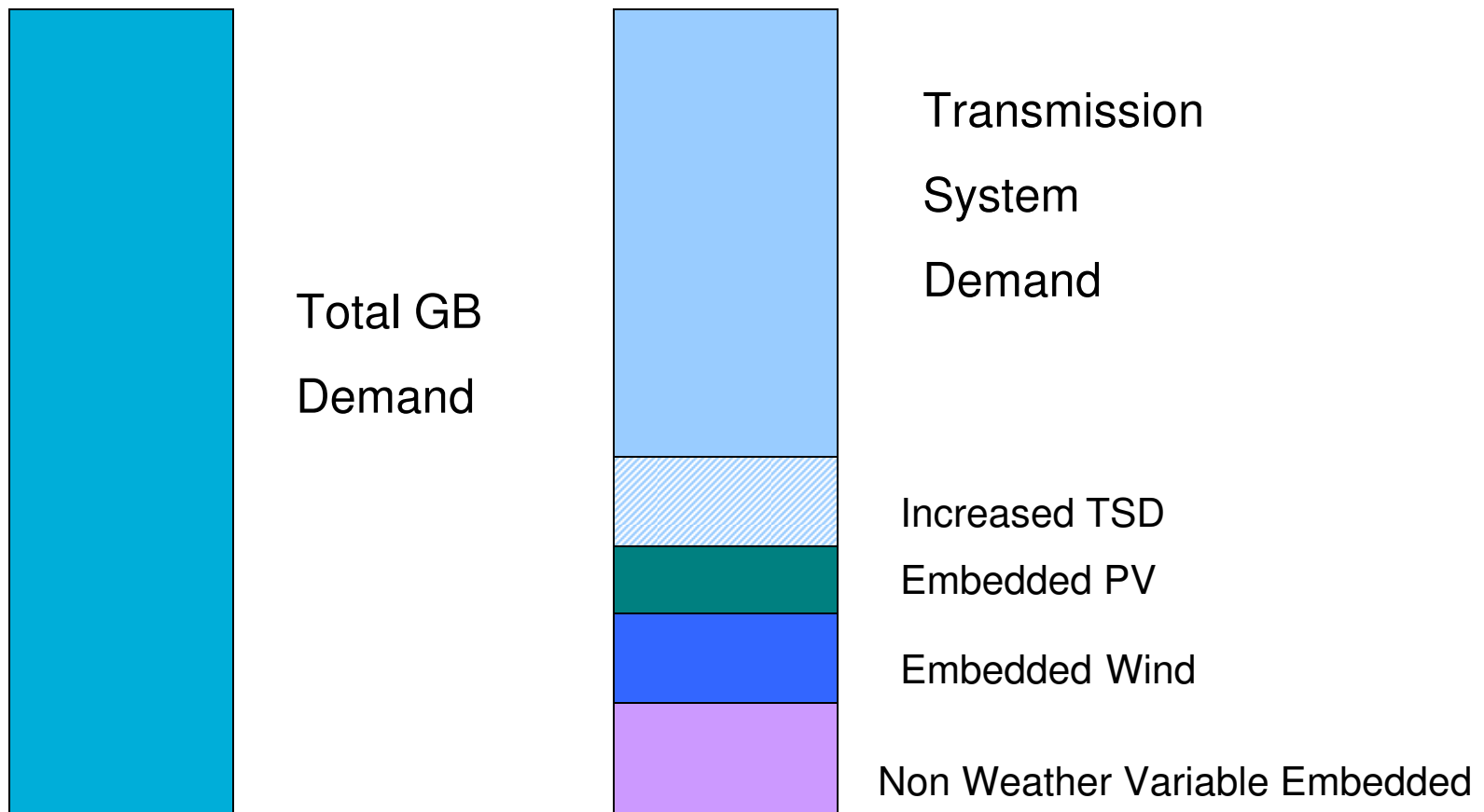
# Forecasting Solar Generation

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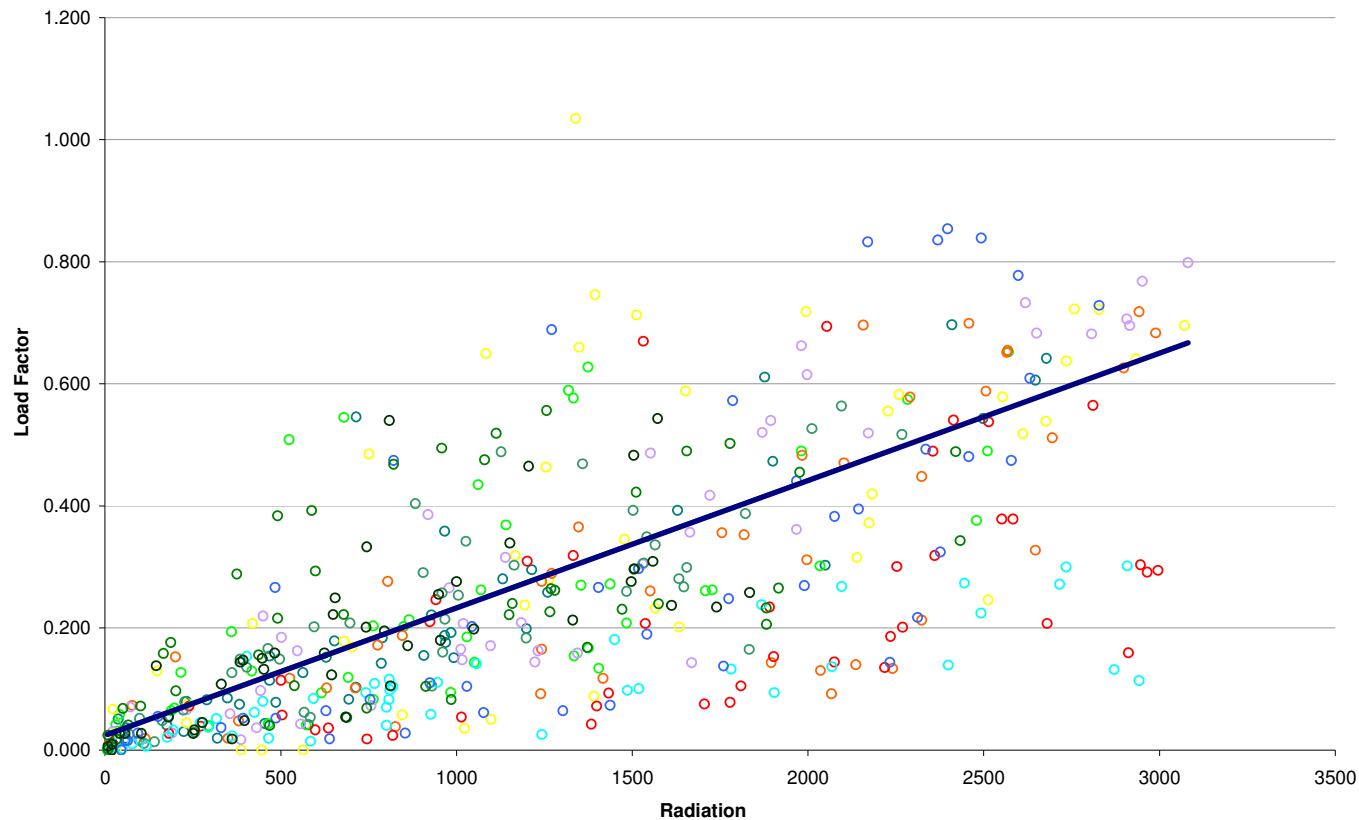
# Forecasting Solar Generation

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## Forecasting Solar Generation – Initial Model

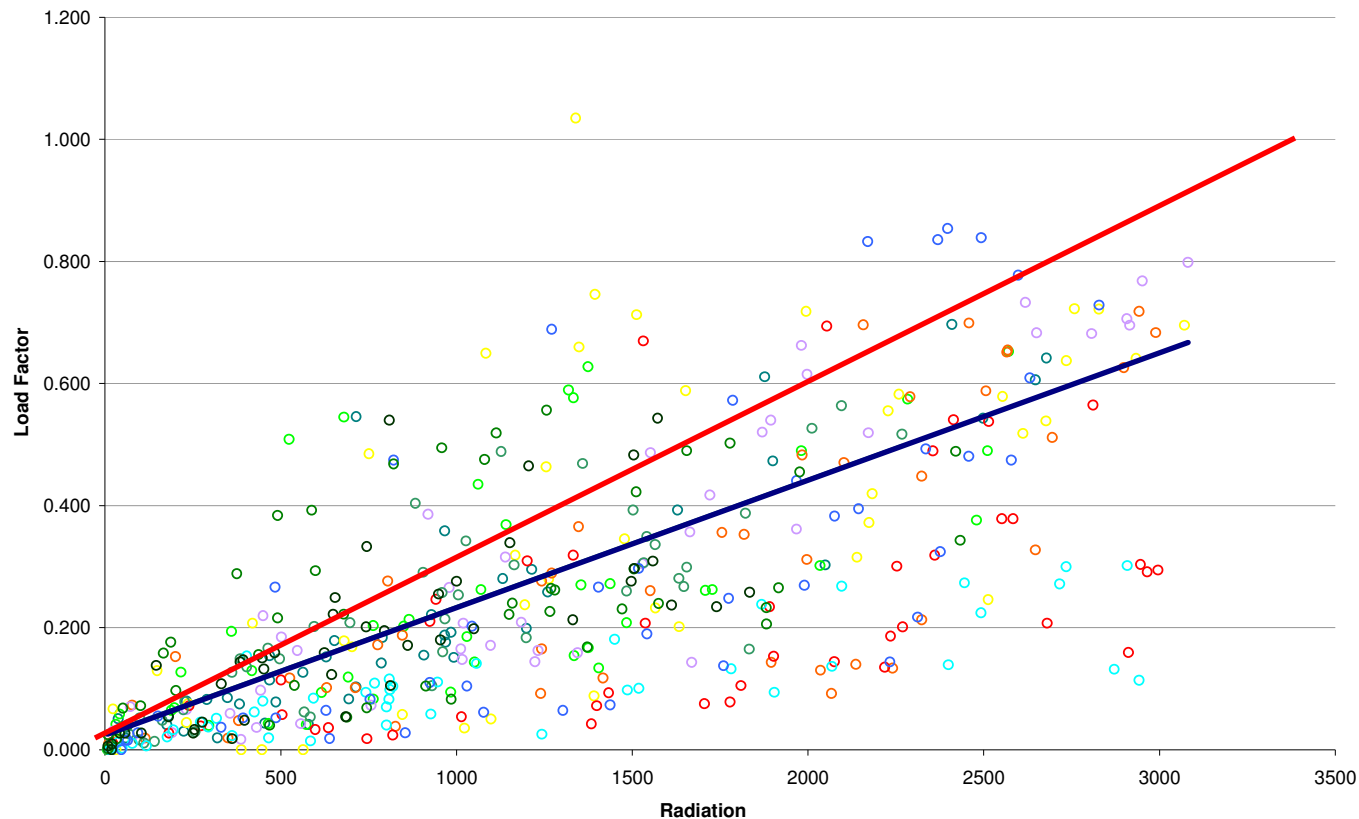
- Calculated average load – solar irradiation correlation based on observations at a number of sites
- Maximum Observed Load Factor 0.8



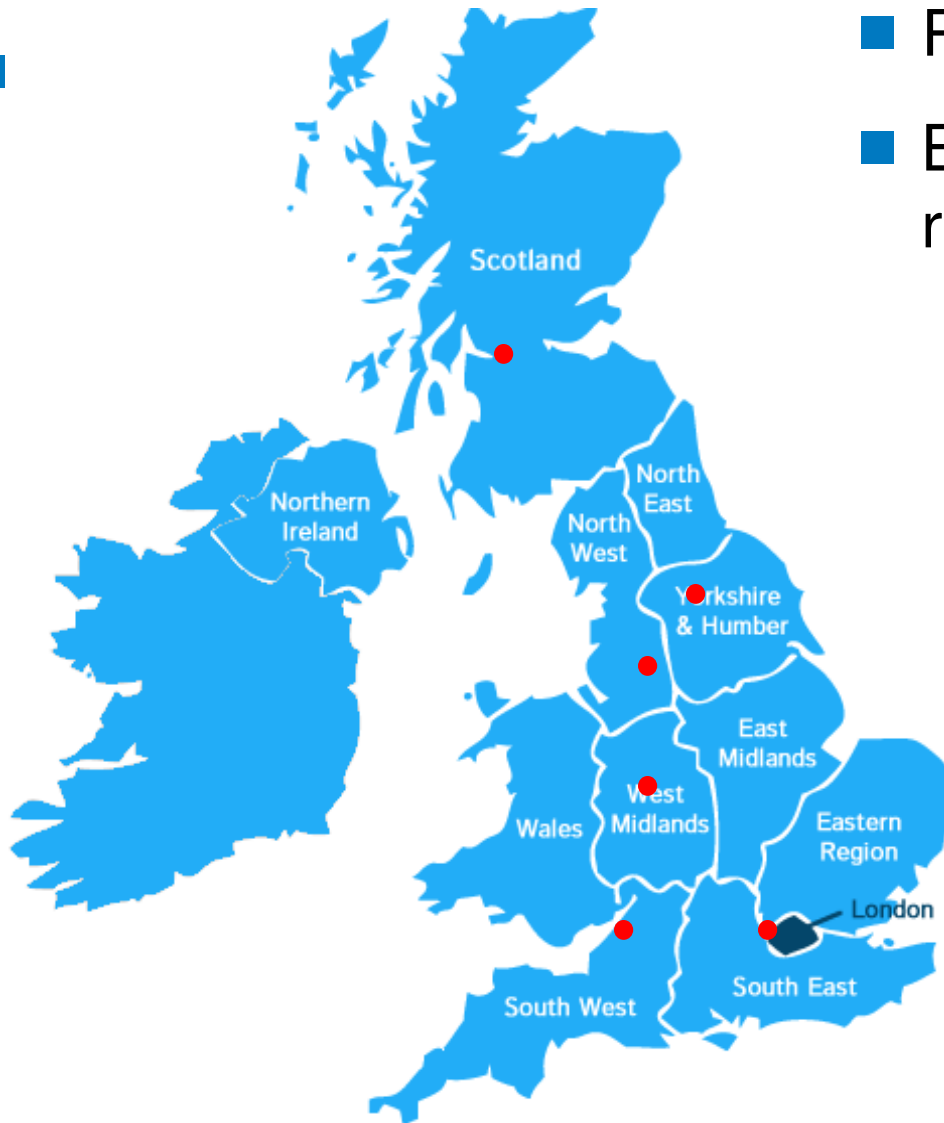


## Forecasting Solar Generation – Latest Step

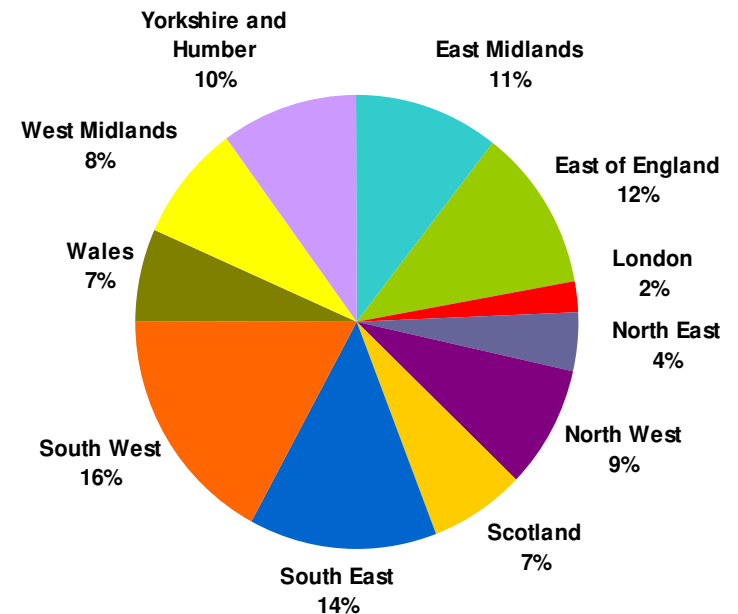
- Apply uplift factor to account for capacity underestimation
  - Derived by minimisation of demand forecast error
- Currently Allow Maximum Load Factor 1.0



## Forecasting Solar Generation – Latest Step



- Regional Forecast
- Based on forecast solar radiation at six locations
  - Hourly resolution
  - Four updates per day



## Forecasting Solar Generation – Estimated Outturn

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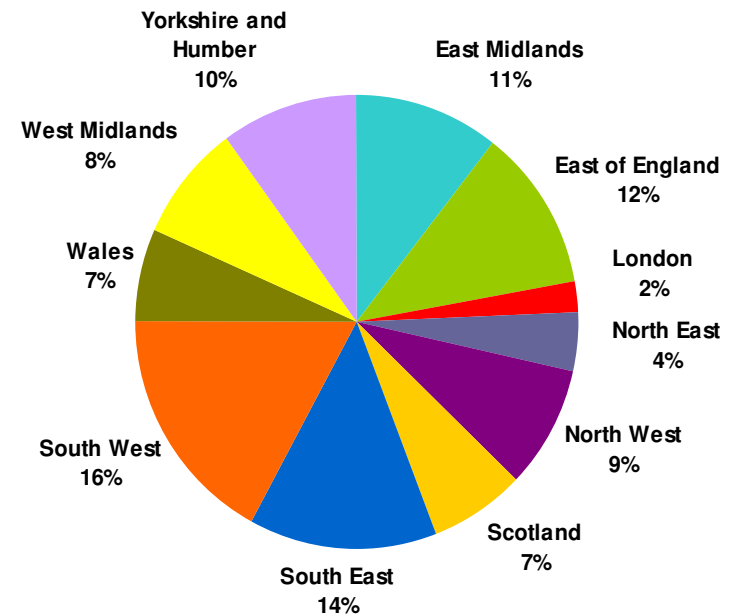
- National Grid currently receives no metering data from any PV generation
- Published Estimated Outturn data is based on
  - Metered Outturn solar irradiation at 40 weather stations
  - Estimated capacity from DECC website
  - Derived correlation between solar irradiation and generation

# Forecasting Solar Generation – Estimated Outturn



- Estimated Outturn calculated from measured solar radiation at 40 locations

- Hourly resolution



## Forecasting Embedded Wind Generation

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- National Grid forecasts generation from wind farms for which it has no operational metering
- These are referred to as Embedded wind generation
- **Not the same as Grid Code definition of Embedded**
- Embedded wind generation refers to any wind farm not on the list of generators in the definition of INDO

## Forecasting Embedded Wind Generation

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- National Grid seeks to model all wind farms of 2 MW or greater capacity
- Uses publically available data sources to glean information on capacity and location of wind farm
- National Grid receives wind speed forecasts for 56 locations at hourly resolution, updated four times per day
- Output of each embedded windfarm is forecast using closest wind forecast location and generic power curves

# Forecasting Embedded Wind Generation

## - Estimated Outturn

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- Embedded wind generation is that for which National Grid currently receives no metering data
- Published Estimated Outturn data is based on
  - Final forecast wind speed, overwritten by Metered Outturn wind speed from 40 weather stations where weather station is sufficiently close to wind farm
  - Estimated capacity
  - Generic wind power curves

## Future Developments

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### ■ PV

- 2-D Models
  - Solar Irradiation + Temperature
- Improved Power Curves
- Data to develop models

### ■ Embedded Wind

- 2-D Models
  - Wind speed + Wind Direction
- Improved Power Curves
- Automation of some error checking
  - Model errors for individual wind farms
  - Metering errors



# Overview of New Information

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Home | Our services | Our company | In your area | **Industry Information** | Careers

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Industry information

Domestic gas customer satisfaction survey

Gas Commercial Frameworks

Gas Distribution Shipper information

Gas capacity methodologies

Gas Transmission operational data

Gas transmission system operations

Gas system operator incentives

Gas Distribution system charges

Gas Transmission system charges

Gas Transmission Charging Methodology

Electricity codes

Electricity Transmission operational data

Codes, Principles and Methodologies

**Data Explorer**

Forecast Volumes and Costs

Outcome Energy Services

Outcome System Services

**Data Explorer**

On this page you will find data published by National Grid relating to the commercial operation of the electricity transmission system. This data includes cost and volume forecasts and outcomes relating to balancing services, BSUCS, reserve, response and BSISA information.

The data also includes information associated with contract and services reports showing the costs of balancing services and the results of tender assessments.

**Real Time Demand Data - Last 60 Minutes**

**Historical Demand Data**

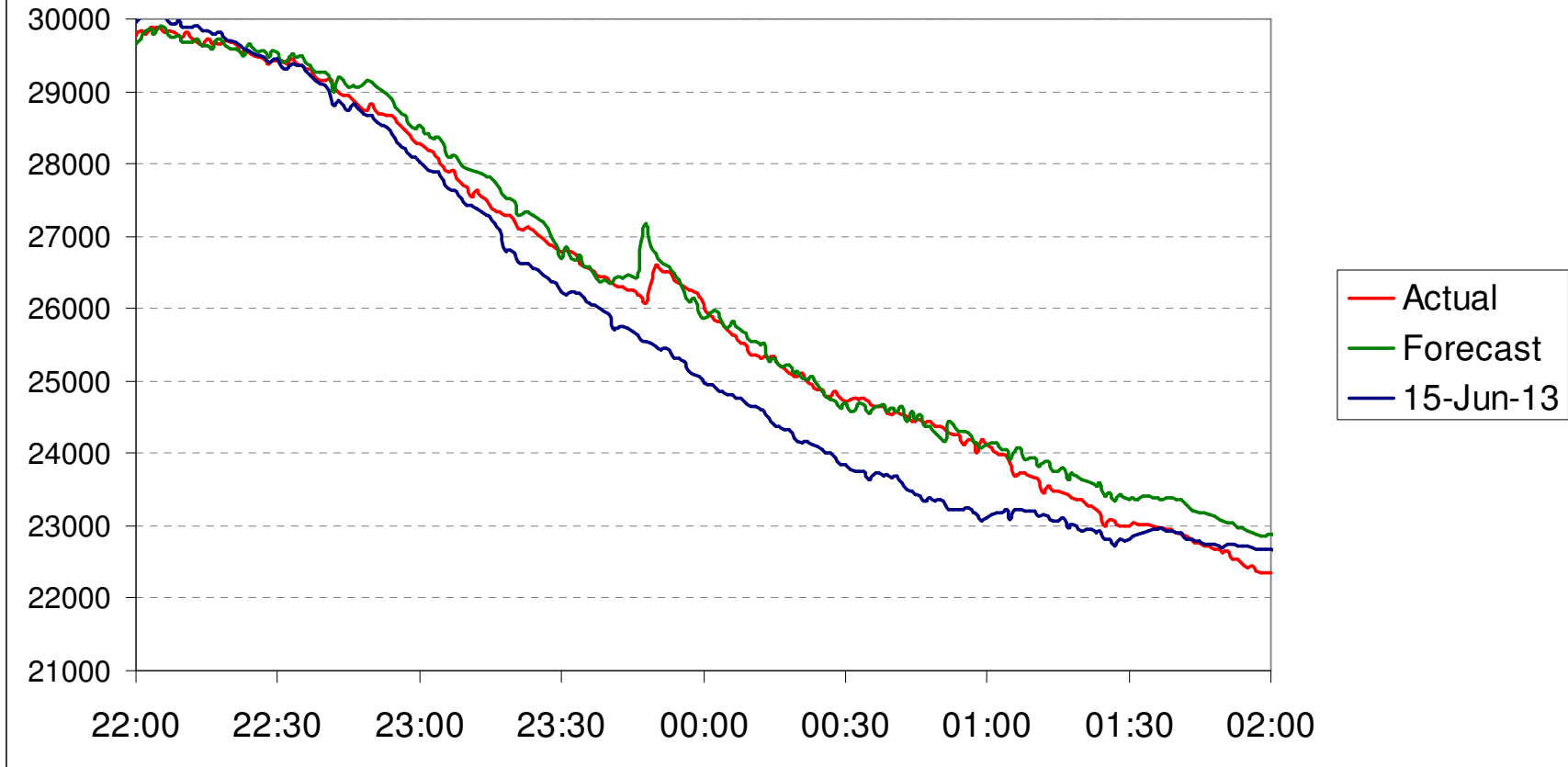
Date	File Name	Action	Size
12 Jun 2014	Field Descriptions	Download	46 KB
16 Jun 2014	DemandData_Update	Download	62 KB
28 May 2014	BMU List	Download	31 KB
28 May 2014	Historic Demand Data	Download	46 KB
13 Jun 2014	DemandData_Historic	Download	16454 KB
12 May 2014	Demand_Jan to Apr 2014	Download	890 KB
22 Apr 2014	Demand_Jan to Mar 2014	Download	885 KB
18 Mar 2014	Demand_Jan to Feb 2014	Download	741 KB

- Two New Files,
  - in Data Explorer Area
- DemandData\_Historic.csv
  - Data from April 2005
  - Updated Monthly (Second week)
- DemandData\_Update.csv
  - Latest operational data
  - Latest forecast
  - Updated Daily

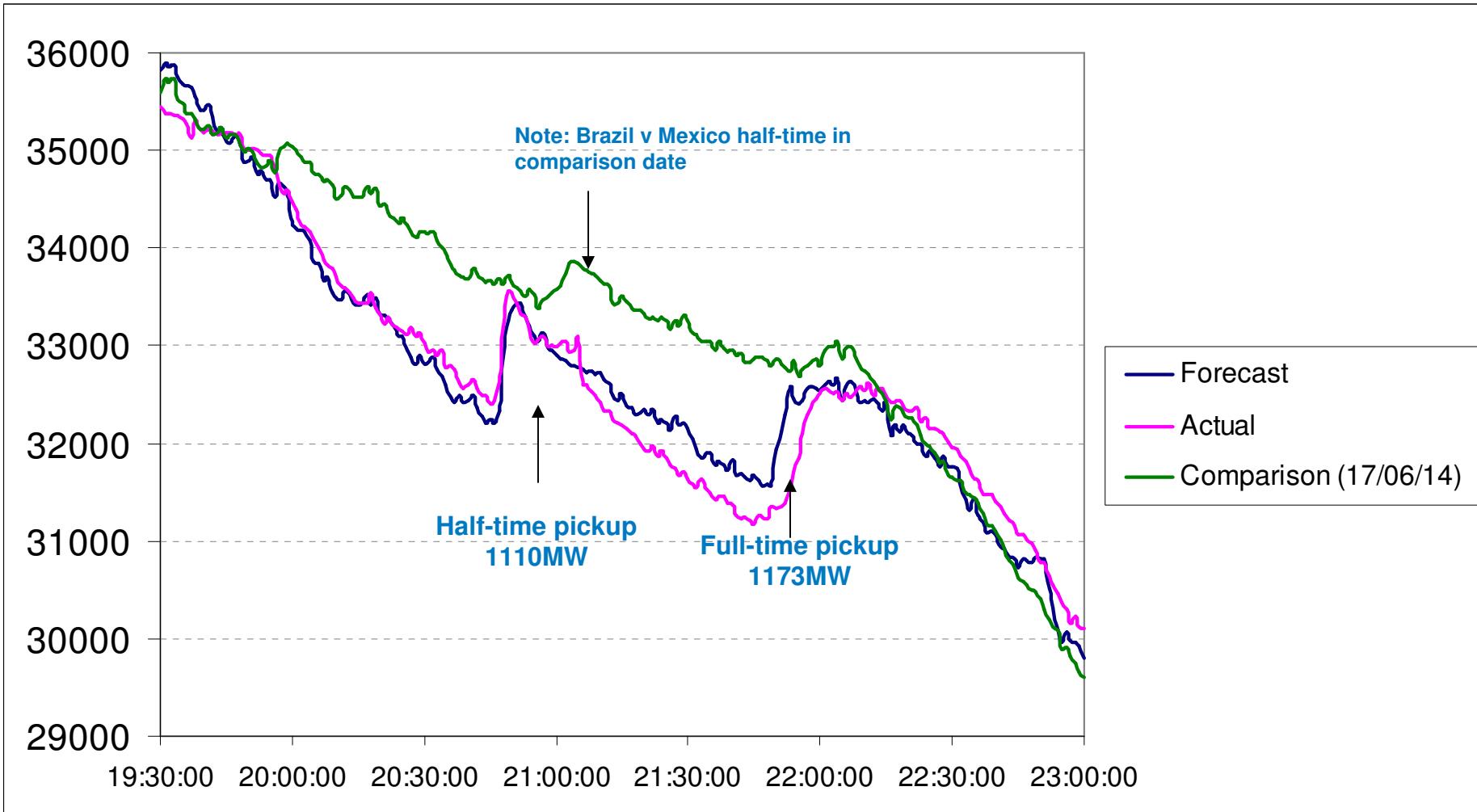
# England v Italy



## England v Italy World Cup 2014 Saturday 14th June Forecast



# England v Uruguay



## Any Questions

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Contact

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