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Improved PV & Embedded Forecasting



Jeremy Caplin - Energy Forecasting Manager

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Improved PV & Embedded Forecasting

- National Grid estimate of PV Capacity taken from DECC website passed 3 GW last week (Fri 20th 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

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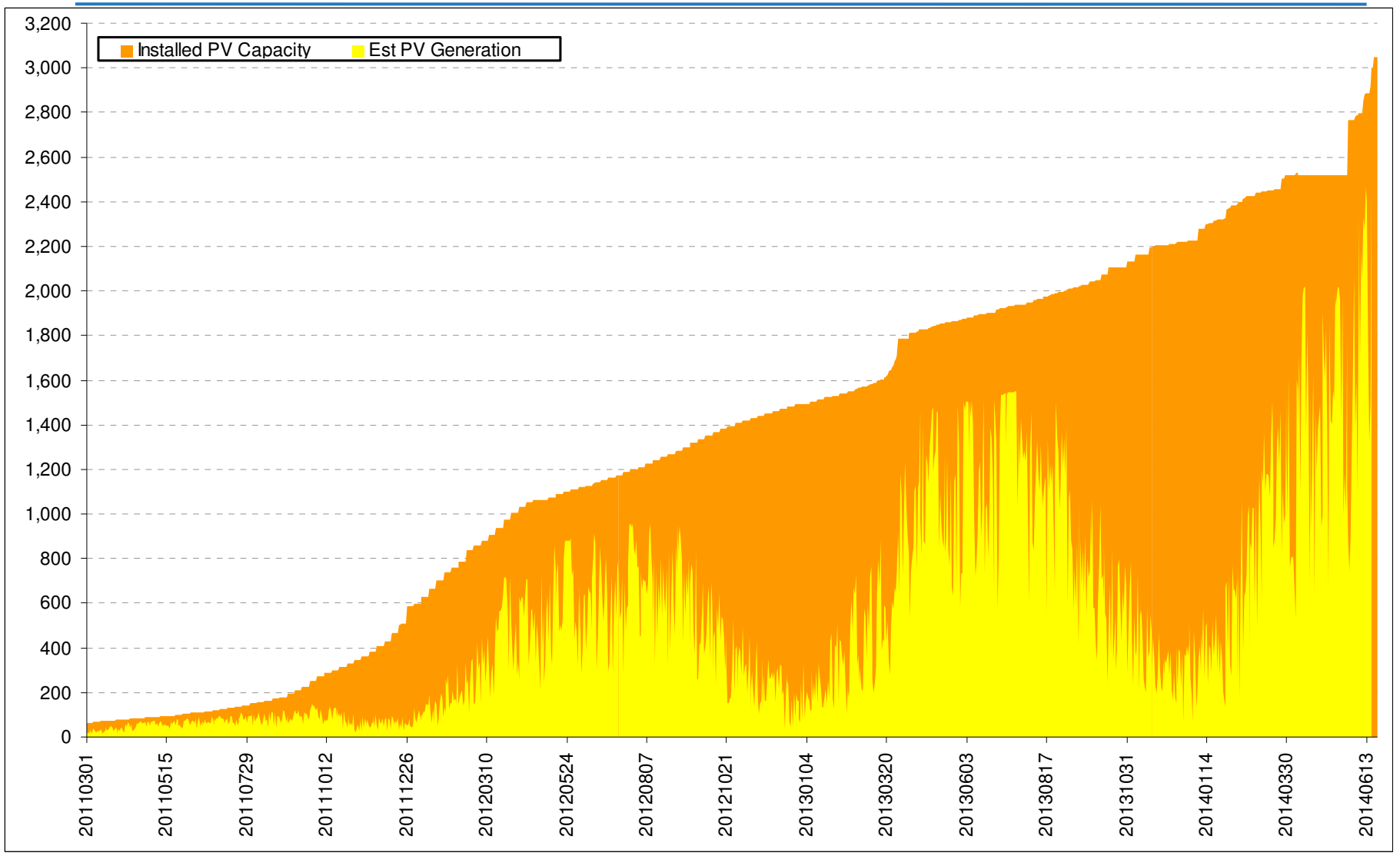

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Forecasting Solar Generation

- 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

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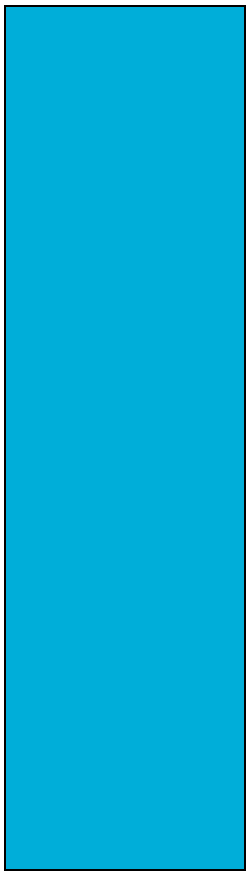
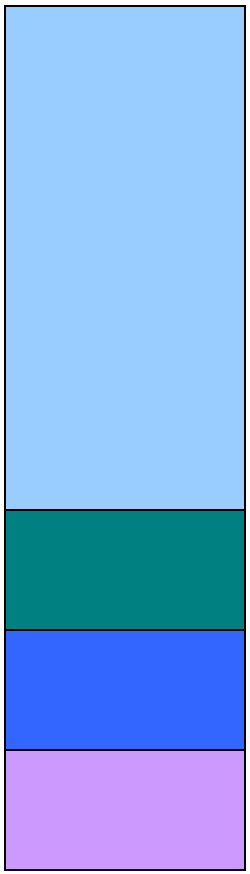
Forecasting Solar Generation



Total GB Demand



Transmission System Demand

Embedded PV

Embedded Wind

Non Weather Variable Embedded

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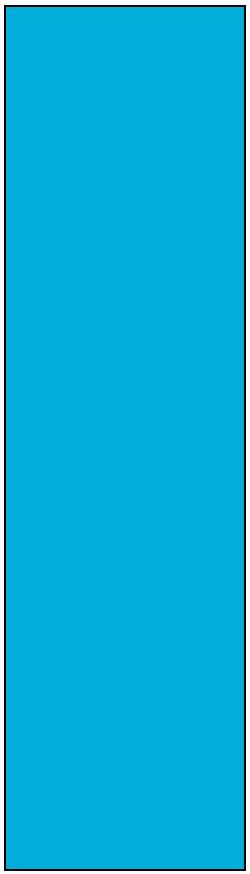
Forecasting Solar Generation



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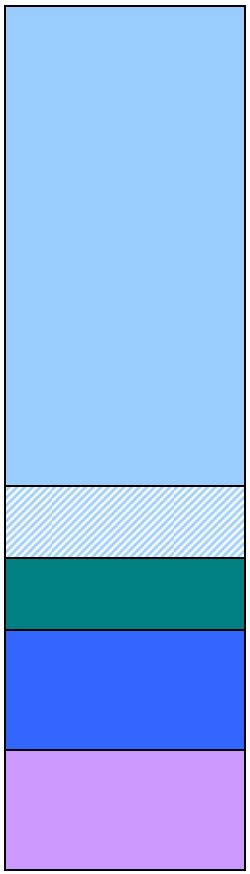

Transmission System Demand

Increased TSD

Embedded PV

Embedded Wind

Non Weather Variable Embedded

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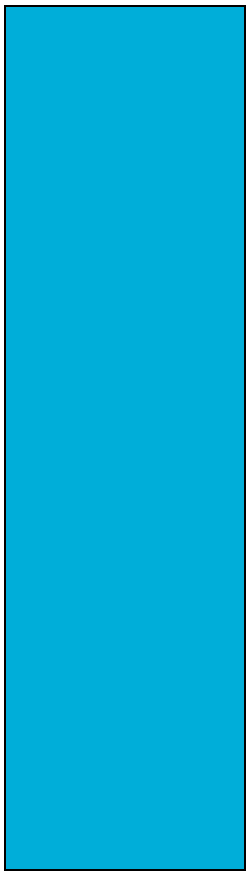
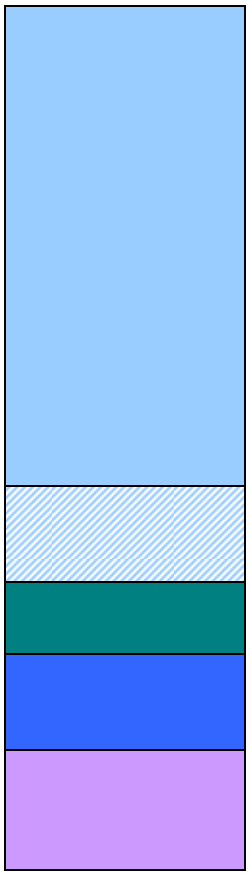
Forecasting Solar Generation



Total GB Demand



Transmission System Demand

Increased TSD

Embedded PV

Embedded Wind

Non Weather Variable Embedded

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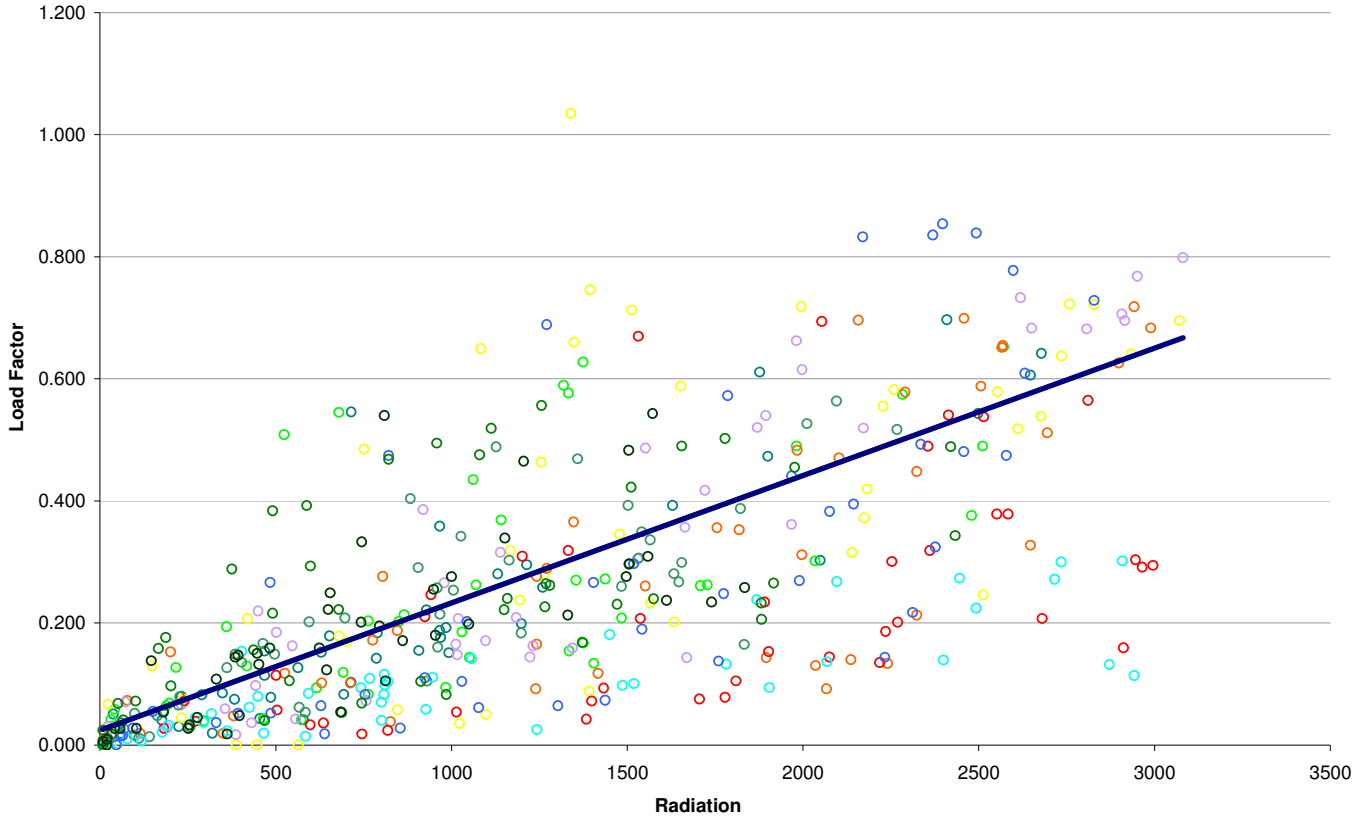
Forecasting Solar Generation – Initial Model

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



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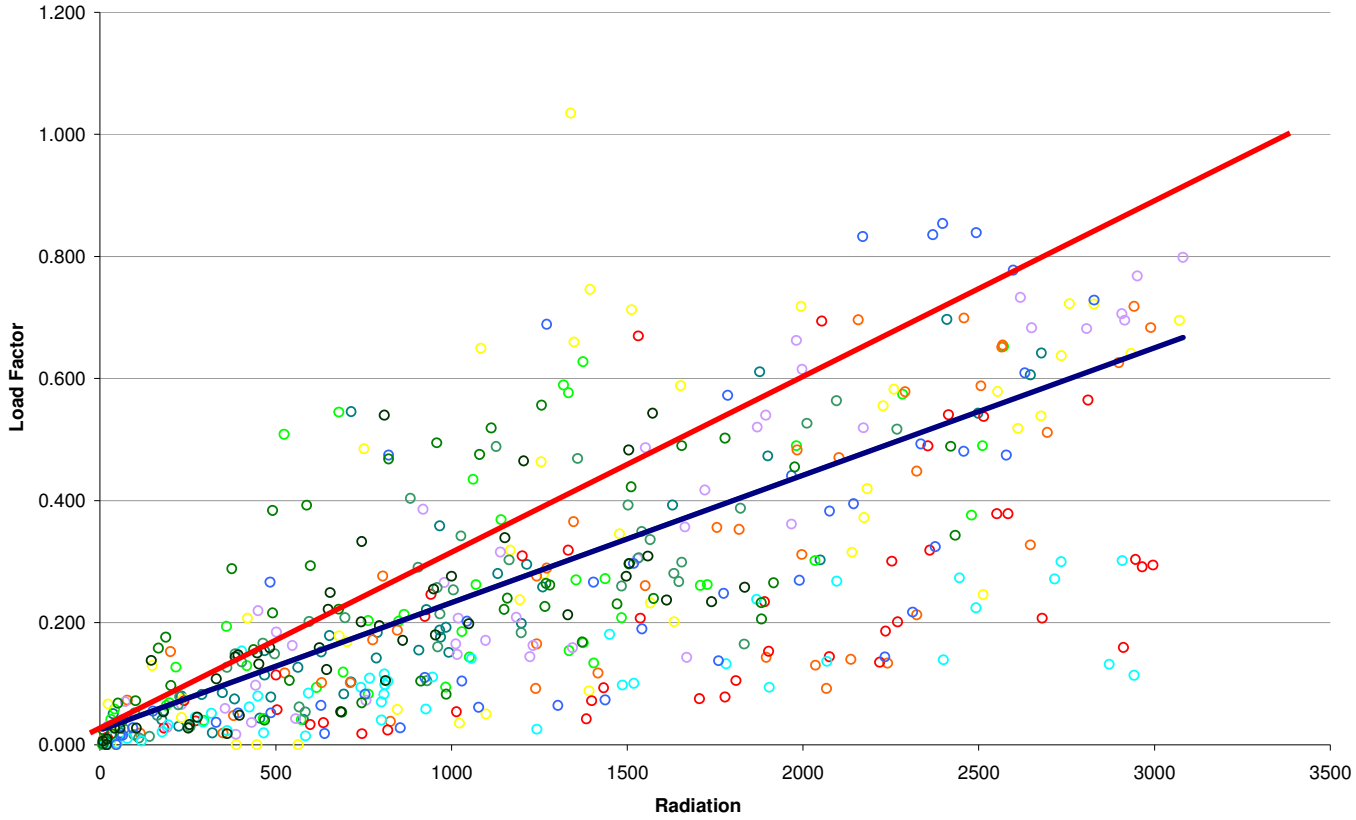
Forecasting Solar Generation – Latest Step

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



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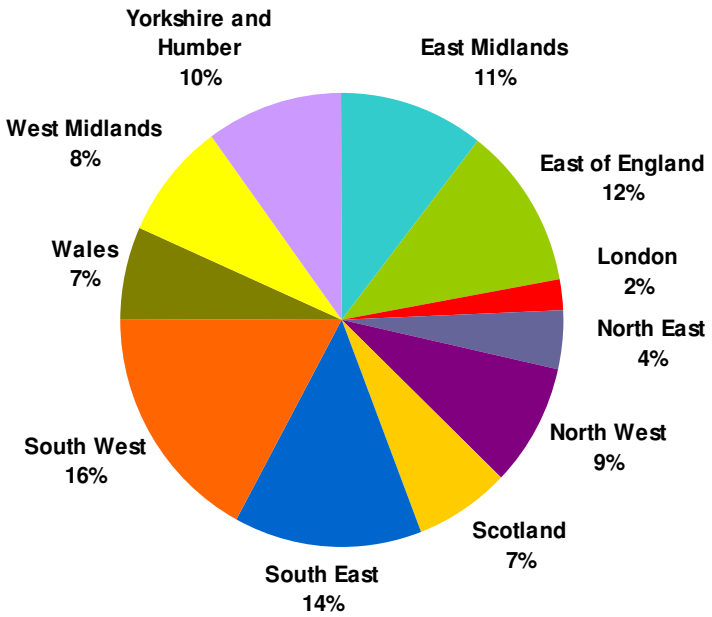
Forecasting Solar Generation – Latest Step

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



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Forecasting Solar Generation – Estimated Outturn

- 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

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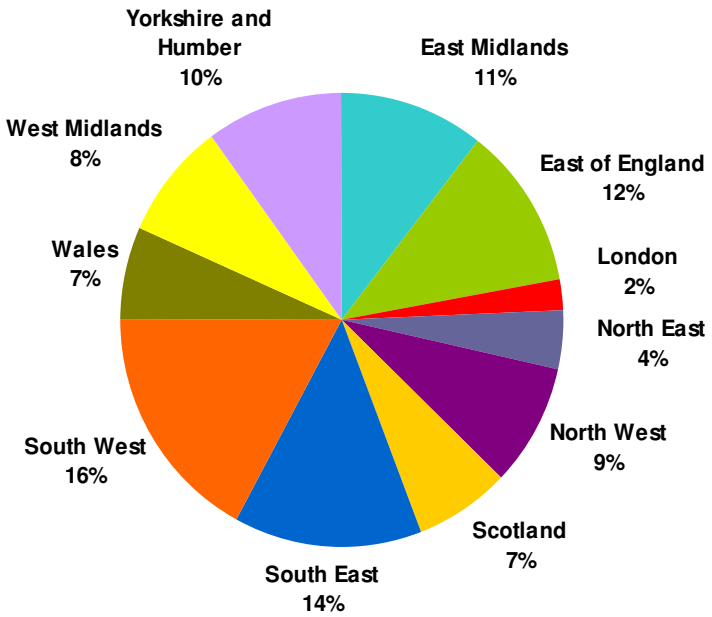
- Estimated Outturn calculated from measured solar radiation at 40 locations
  - Hourly resolution



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Forecasting Embedded Wind Generation

- 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

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Forecasting Embedded Wind Generation

- 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

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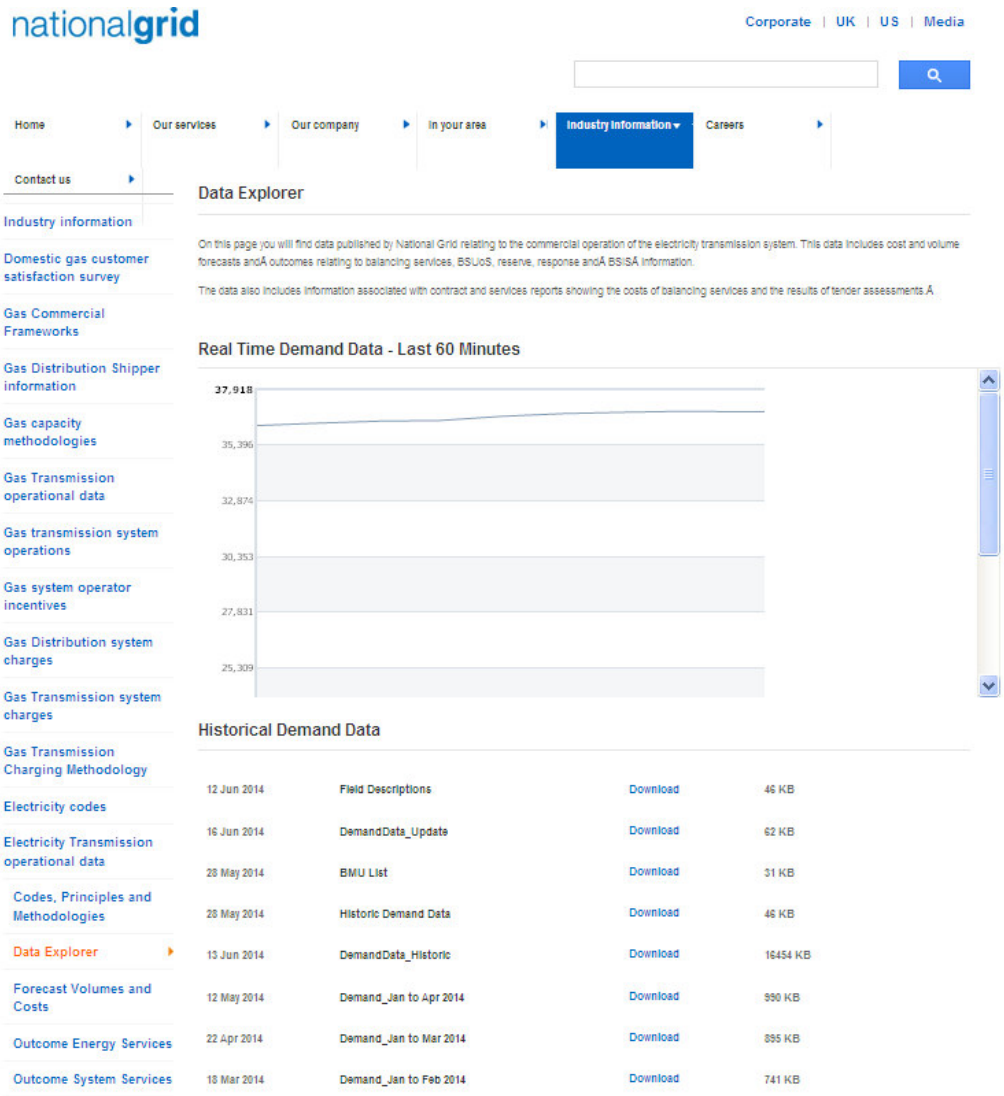
Future Developments

- 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



- 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

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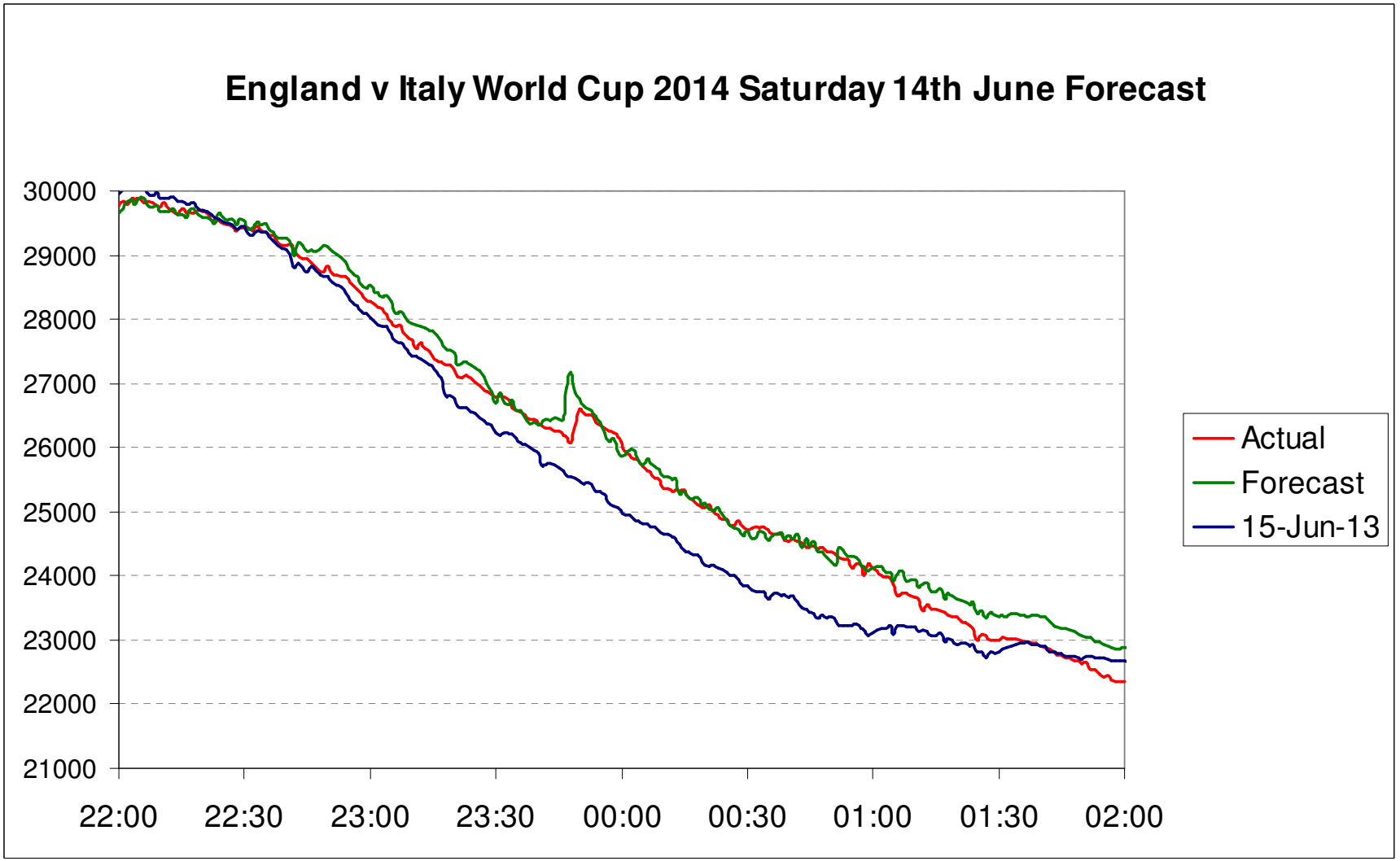
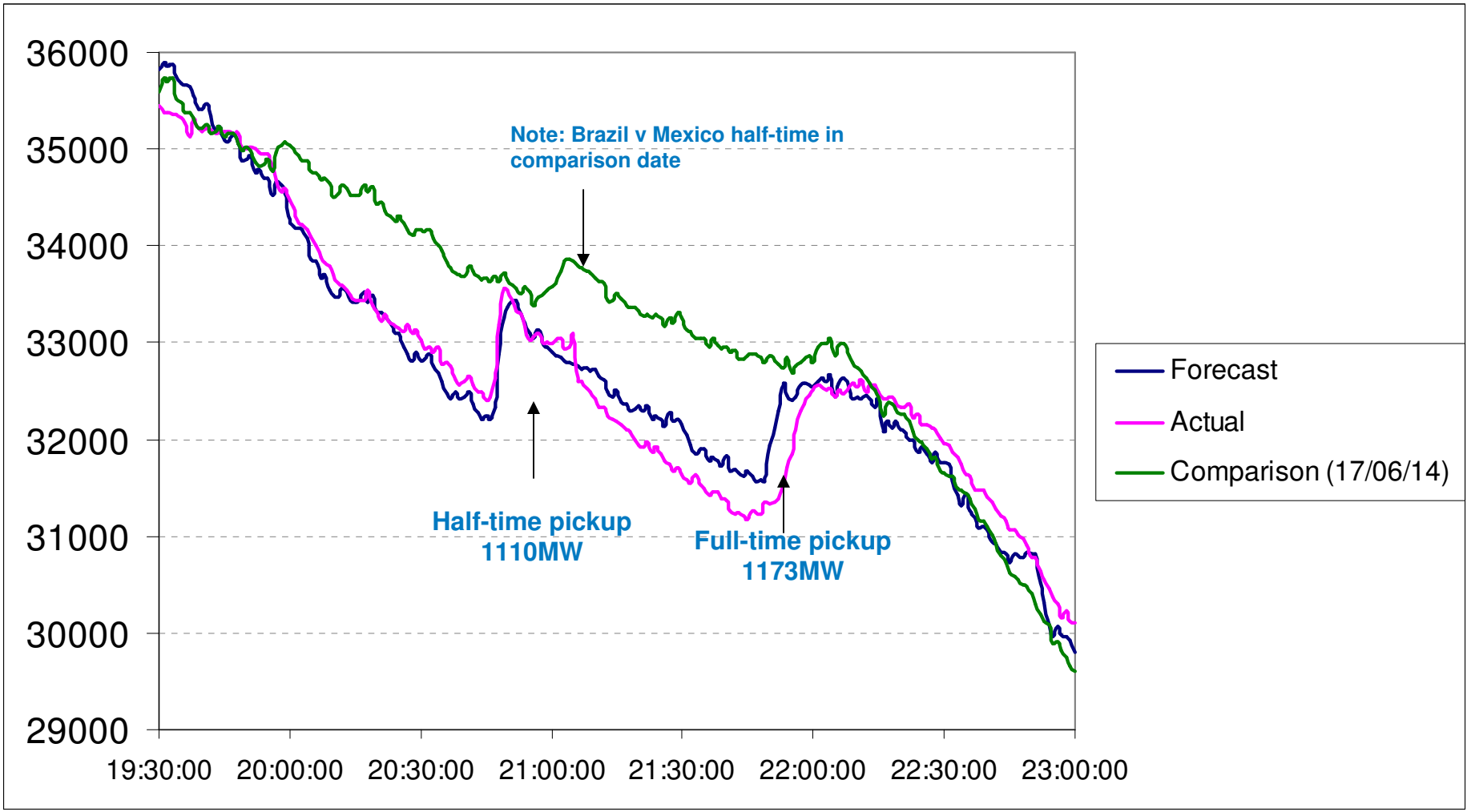


England v Uruguay



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Any Questions

Contact

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