UPDATE OF DESIGN SUMMER YEARS AND TEST REFERENCE YEARS WEATHER FILES – TECHNICAL OVERVIEW

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<table>
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<th>Reason for update</th>
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<td>What was updated?</td>
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<td>Design Summer Year update</td>
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<td>Case studies – DSY</td>
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• The original files were released in 2006 and were created from a baseline of 1984 – 2004.

• By updating this baseline, will incorporate any effects of a warming climate, both TRY and DSY are selected from 1984 – 2013 baselines.

• Issues with the previous methodology for selecting with Design Summer Year files – did it select years with summers that had overheating events?

• Evidence of inconsistencies included some TRY weather files producing more overheating than DSYs for certain locations.

• Previous dataset used UKCIP02 climate projections when morphing weather files. UKCP09 climate projections superseded these scenarios.
The TRY weather file represents a typical year and is used to determine average energy use within buildings.

Same methodology: select representative months using air temperature, relative humidity, and cloud cover as primary variables with wind speed as a secondary parameter.

The primary variables are used to find three months with the lowest ranking. From these months, the month with the most average wind speed is then chosen as the representative month for that location.

The baseline for selecting these months has been updated.
• Previous methodology: calculating the mean temperature over the period April to September for each year in an observational dataset – DSY was the chosen as the third hottest year.

• Probabilistic Design Summer Years (pDSYs) for London were produced as part of TM49 to replace the DSY with a set of years which better describe overheating events:
  • relative severity
  • expected frequency

• New files are selected using new metrics based on how far external temperatures depart from internal comfort temperature of a conceptual building.
To choose candidate years for DSY, the metrics are used to rank historical years in terms of return period of hot events and the duration and intensity of these events:

**Events** (warm spells) – a continuous period where at least one hour of each day goes above a threshold temperature.

**Intensity** – the total of the metric divided by the number of days (duration) of the event.

**Return period** of a hot event refers to the frequency of the event with an associated exceedance value.
As with London pDSYs – 3 files available per location:

- **DSY1: Moderately warm summer:**
  
  Any given future summer has a 1-in-7 chance of being equal or hotter than the selected DSY.

- **DSY2: Short, intense warm spell**
  
  Represents an intense extreme year – has a heat event the same length as the DSY1 but has a higher intensity.

- **DSY3: Long, less intense warm spell**
  
  The long extreme year – less intense extreme than the high intensity year, more intense extreme than the moderate summer year, but also longer duration heat event than the moderate summer year.
• Two case studies tested, existing naturally ventilated semi-detached dwelling and an office.

• Two scenarios are tested for each building, an uninsulated poorly designed base case and an insulated case which meets current Part L1A building regulations.

• Old stationary overheating criteria.

• Provide indicative examples of how certain buildings will respond to changes to the new files.
Results for uninsulated scenario:

Dwelling uninsulated - Bedroom

% Hours Temp > 26 deg

-1% 1% 3% 5% 7% 9% 11% 13%

Belf Bis Car Edin Glas Lee Lon Manc New Nor Not Plym South Swin

DSY1 DSY2 DSY3 Old
Results for uninsulated scenario:
CIBSE weather files

• Future files are produced from the observed data using a “morphing” methodology.
• The morphing methodology “shifts” and “stretches” the current observed data from the original baseline using UKCP09 climate projections.
• This allows comparable performance of current and future simulations.

Prometheus weather files:

• Current weather generator files use the rainfall from a 1961 – 1999 baseline for calibration and then are morphed using UKCP09 projections to produce future weather files.
• The solar model used in the weather generator to create values for solar radiation is different to the one used to produce CIBSE files.
• Current CIBSE weather files are not directly comparable
Technical briefing:

CIBSE Weather Files 2016 release: Technical Briefing and Testing

Authors: Dane Virk and Matt Eames

Test Reference Years
The TRY weather file represents a typical year and is used to determine average energy usage within buildings. The weather file consists of average months selected from a historical baseline. The previous release of the TRY used a baseline of 1984 to 2004 to select candidate months. The methodology used is based on the ISO method (British Standards & Institution 2005). The ISO selects

- References to BSERT papers and other literature for further reading