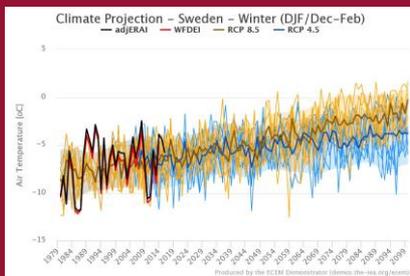


**EUROPEAN CLIMATIC ENERGY MIXES (ECEM)**

**KEY MESSAGES**

**ECEM KM 02**

**A warmer future**



*A series of Key Messages for the European energy sector based on the analysis of data in the ECEM Demonstrator.*

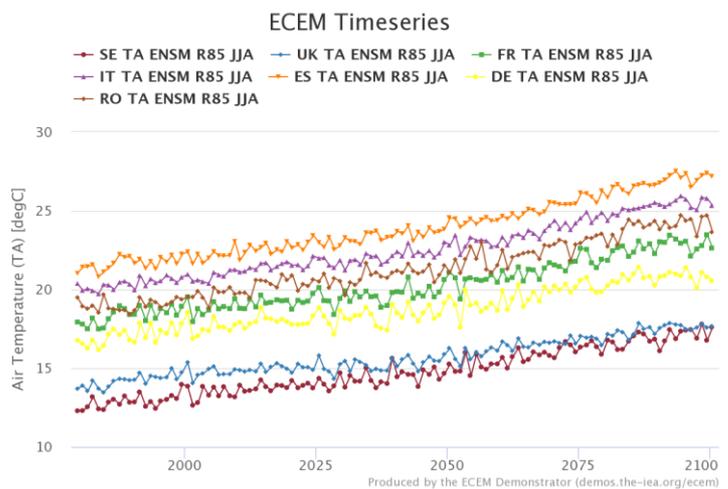


**Key messages: A warmer future**

- Climate model projections for Europe indicate major warming of about 3 to 5 °C on average by 2100 for a high greenhouse gas emissions scenario
- These trends are robust when considering variability across different models, although there is some uncertainty in the magnitude of warming
- The projections indicate more frequent high temperature extremes. For Spain and a high emissions scenario, for example, almost every year after about 2050-2070 (depending on model) is indicated to be warmer than the summer of 2003
- Warming of this magnitude is likely to impact energy demand as well as solar and hydro supply

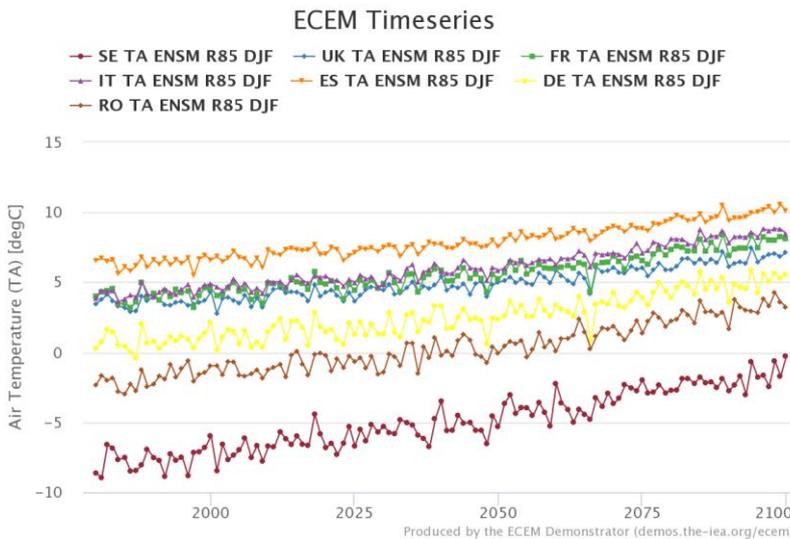
**How do we know the future will be warmer?**

Climate projections for Europe show warming continuing to the end of the century under a high greenhouse gas emissions scenario (RCP8.5). The plot below shows projections (as the average of seven different regional climate models (RCMs)) for summer (June, July and August) for seven countries (Sweden, UK, France, Italy, Spain, Germany and Romania).



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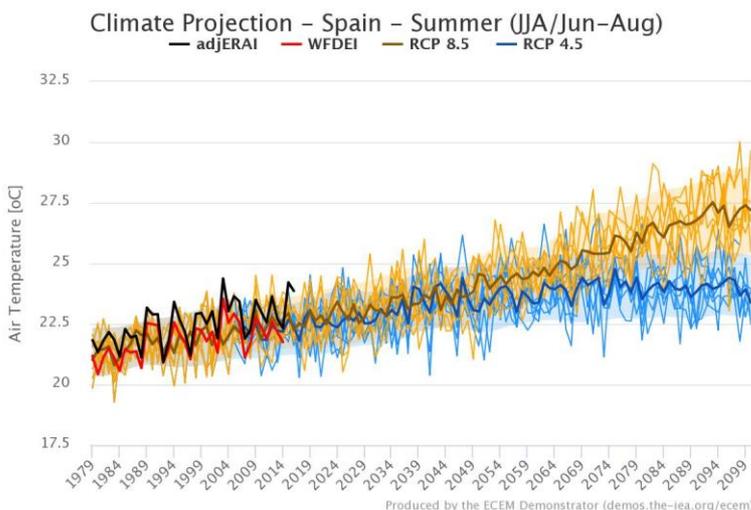
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On the left are the RCP8.5 projections for the same seven countries for winter (December, January and February).

Below are the differences (°C) in long-term (30-year) temperature averages between 2071-2100 and 1981-2010, showing that the end of the century is projected to be 2.8 °C (Romania) to 5.3 °C (Germany) warmer than the recent 30-year period. For Sweden and Germany the warming is strongest in winter, whilst for the UK, France and Italy it is strongest in summer.

	Sweden	UK	France	Italy	Spain	Germany	Romania
<b>Summer</b>	3.3	4.6	3.9	4.5	4.5	3.7	2.9
<b>Winter</b>	3.7	3.1	3.2	3.6	4.3	5.3	2.8



The two previous plots show the ensemble average only for RCP8.5 whereas the plot on the left (for summer temperature in Spain) also shows the 7 individual RCMs as well as projections for a lower emissions scenario (RCP2.6 in blue). Observed values for 1979-2016 are also shown (red/black lines) and lie within the ensemble range. All models show warming, but with some differences in magnitude, and as expected warming is lower for RCP2.6. For RCP8.5, after about 2070 almost all values exceed the threshold of 24.4 °C which is the mean summer temperature observed in 2003.

### What does this mean for the energy sector?

Temperature is also used (with radiation) to estimate solar generation. Thus these large projected warming trends have the potential to impact both energy demand and supply.

*All the above figures were produced and downloaded from the ECEM Demonstrator. The numbers in the table were obtained by downloading the relevant data file in csv format. Data for other countries and/or seasons can be explored in the Demonstrator.*

*If you have questions or comments on these Key Messages please submit your feedback via the Feedback link in the ECEM Demonstrator.*