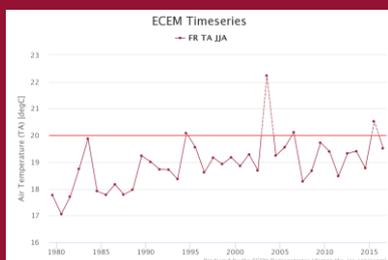## EUROPEAN CLIMATIC ENERGY MIXES (ECEM)

KEY MESSAGES
ECEM KM 01

A warming Europe

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

Key messages: A warming Europe

➢ Temperatures have risen consistently across Europe over the last ~40 years
➢ In countries such as Germany the warming has been strongest in winter whereas in Spain, for example, it is strongest in summer
➢ At the same time, variability from year-to-year and day-to-day persists, and cold events have continued to occur in recent years
➢ Temperature is a major driver of the ECEM models for energy demand and of solar and hydro supply thus these trends and patterns of variability will impact estimates of these energy variables
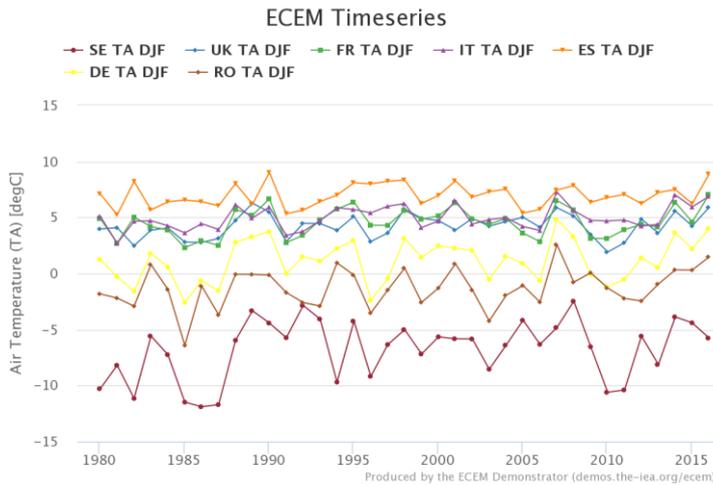
How do we know Europe is warming?

Warming trends are evident in time-series plots of historic air temperature data (°C) for 1979-2016 including those for the seven countries shown here (Sweden, UK, France, Italy, Spain, Germany and Romania). The plot below shows the trends for summer (June, July and August).
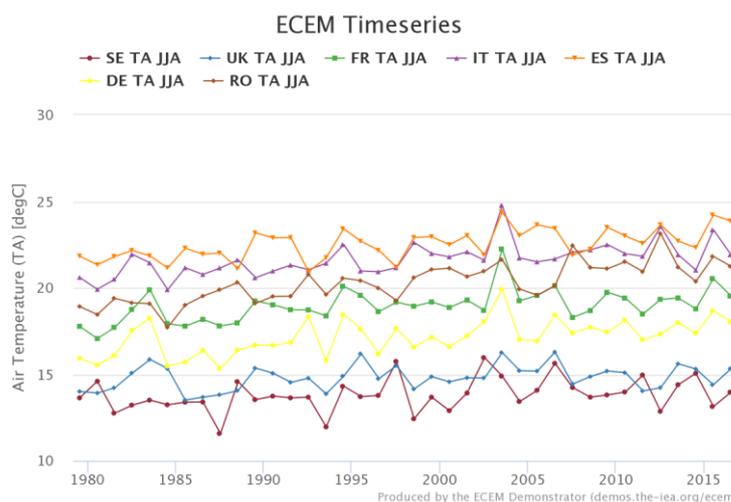
For more information visit
www.ecem.climate.copernicus.eu
*or contact the ECEM team at*
support@ecem.climate.copernicus.eu

Date of publication: 25 June 2017

ECEM Timeseries

SE TA DJF UK TA DJF FR TA DJF IT TA DJF ES TA DJF
DE TA DJF RO TA DJF

Produced by the ECEM Demonstrator (demos.the-iea.org/ecem)

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

Below are the differences (°C) between temperature averages for 2007-2016 and 1979-1988, showing that the most recent 10-year period is warmer on average than the first 10-year period by 0.5 °C to almost 2.5 °C. For Germany the warming is clearly strongest in winter, whilst for the UK, France, Italy and particularly Spain it is strongest in summer.

	Sweden	UK	France	Italy	Spain	Germany	Romania
Summer	1.44	1.24	1.13	1.33	2.35	0.62	0.50
Winter	1.50	0.57	0.95	1.10	1.60	2.42	0.51

ECEM Timeseries

SE TA 01d

Produced by the ECEM Demonstrator (demos.the-iea.org/ecem)
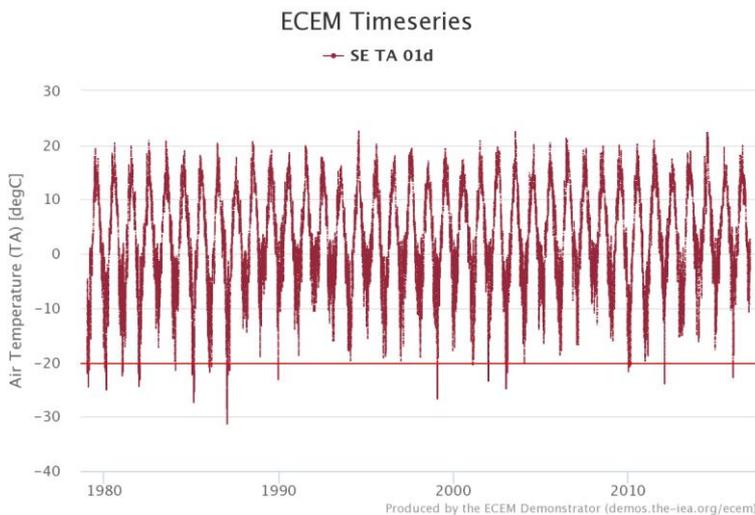
At the same time, variability from year-to-year and day-to-day persists, as this example of daily temperature for Sweden shows. The warming trend means that days below -20 °C (red horizontal line on the plot) are more frequent in the early years. Nonetheless a few such cold days have continued to occur in recent years.

What does this mean for the energy sector?

Daily temperature is one of the variables (along with solar radiation, wind speed and relative humidity) used to estimate demand (electricity load) in the ECEM models. Temperature is also used (with precipitation) to estimate hydropower generation and (with radiation) to estimate solar generation. Thus these trends and patterns of variability have the potential to affect 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.