Royal Netherlands
Meteorological Institute
Ministry of Infrastructure and the Environment

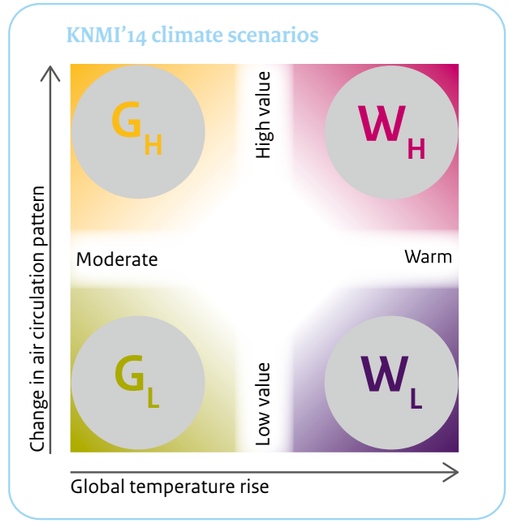
KNMI'14
climate scenarios *for the Netherlands*

KNMI'14 Key figures

Variabele	Indicator	Climate 1981-2010	Scenario changes for the climate around 2050				Scenario changes for the climate around 2085				Natural variations averaged over 30 years
			G_L	G_H	W_L	W_H	G_L	G_H	W_L	W_H	
Global temperature rise:			+1 °C	+1 °C	+2 °C	+2 °C	+1.5 °C	+1.5 °C	+3.5 °C	+3.5 °C	
Change in air circulation pattern:			low value	high value	low value	high value	low value	high value	low value	high value	
Sea level at North Sea coast	absolute level	3 cm above NAP	+15 to +30 cm	+15 to +30 cm	+20 to +40 cm	+20 to +40 cm	+25 to +60 cm	+25 to +60 cm	+45 to +80 cm	+45 to +80 cm	±1.4 cm
	rate of change	2.0 mm/yr.	+1 to +5.5 mm/yr.	+1 to +5.5 mm/yr.	+3.5 to +7.5 mm/yr.	+3.5 to +7.5 mm/yr.	+1 to +7.5 mm/yr.	+1 to +7.5 mm/yr.	+4 to +10.5 mm/yr.	+4 to +10.5 mm/yr.	±1.4 mm/yr.
Temperature	mean	10.1 °C	+1.0 °C	+1.4 °C	+2.0 °C	+2.3 °C	+1.3 °C	+1.7 °C	+2.8 °C	+3.7 °C	±0.16 °C
Precipitation	mean amount	851 mm	+4 %	+2.5 %	+5.5 %	+5 %	+5 %	+5 %	+6 %	+7 %	±4.2 %
Solar radiation	solar radiation	354 kJ/cm²	+0.6 %	+1.6 %	-0.8 %	+1.2 %	-0.5 %	+1.1 %	-0.8 %	+1.4 %	±1.6 %

KNMI has developed four new scenarios for future climate change in the Netherlands around 2050 and 2085. The KNMI'14 climate scenarios provide a consistent picture of the changes in 12 climate variables, including temperature, precipitation and sea level. Each scenario has a different story line, which depends on for example the amount of CO_2 emission. The four KNMI scenarios differ in the amount of global warming (Moderate or Warm) or possible changes in the air circulation pattern (Low or High).

The KNMI'14 climate scenarios form the boundaries of the probable future climate change in the Netherlands. The scenarios will be used to map the impacts of climate change to be able to evaluate the importance and the urgency of climate adaptation measurements. In this way, the KNMI'14 climate scenarios help making decisions for a safe and sustainable environment in the Netherlands.



Royal Netherlands Meteorological Institute, 2014
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Do you want to know more about the KNMI climate scenarios?
www.climatescenarios.nl

KNMI'14 climate scenarios for the Netherlands

How does our climate change and what are the impacts?

The temperature in the Netherlands will continue to rise. Most in winter, least in spring. The number of cold winter days decreases. The number of warm summer days increases, as does the likelihood of heat waves. Temperature differences between the coast and inland will increase in summer and reduce in winter.

In general precipitation will increase further. The likelihood of extreme rain showers with thunderstorms and hail will increase. However, two scenarios (G_H and W_H) indicate a decrease of the mean precipitation in summer.

The rate of sea level change will increase and greatly depends on global temperature rise. The rise will be up to 40 centimeters by 2050 relative to 1981-2010. By 2085 the sea level at the Dutch coast will be up to 80 centimeters higher. After 2100 the sea level will continue to rise.

Changes in wind speed are small. The number of days with southerly to westerly wind directions in summer will decrease in all scenarios, but most in the two scenarios with more change in the air circulation pattern. These G_H and W_H scenarios also show more westerly winds in winter.

Solar radiation has slightly increased during the last decades, partly due to the reduction in air pollution. Also, clouds seem to have become more transparent, causing an increase of solar radiation under cloudy conditions. In the G_H and W_H scenarios a small decrease in cloudiness occurs in future summers due to more easterly winds.

The number of days with fog will diminish and visibility will further improve. This is almost entirely due to the reduction in air pollution. The positive trend in visibility will not be as strong as in the last 30 years. There are considerable regional differences within the Netherlands: less fog occurs along the coast than inland.

Increased winter rainfall will increase peak discharge and flooding risk of the Rhine, Meuse and smaller rivers.

Risks are greatest for ecosystems that depend on precipitation, e.g. heathlands, dry grasslands, rain-fed moorland pools and raised bogs. Risk on natural fires increases.

The process of sea level rise is relatively slow. The number of storm surges will show little change, but rising sea level requires continued monitoring and coastal protection measures.

The number of attractive recreation days increases further.

Energy demand for heating buildings will decrease, but will increase for air conditioning. The supply of cooling water for electricity production will reduce.

Temperature rise will lead to reduced mortality during winter, but increased mortality in summer. During hot summers air quality will deteriorate. Further increase in the number of 'allergy days' due to extension of the growing and flowering season.

Less likely slippery roads due to less cold winters. Increase of heavy showers can cause more traffic disruptions. Heat waves increase the likelihood of damage to roads by rutting.

Long periods of drought can lead to water shortages, water quality issues and salinization. Sea level rise will contribute to salt water intrusion.

Potential crop yields will increase with a longer growing season and higher CO_2 concentrations. The increased likelihood of extreme showers and long periods of drought could threaten harvests.

Photo: The Hondsbossche Seawall | Frans Lemmens, Gettyimages