CallendaR

Data-driven solutions for climate risk mitigation

Why "Callendar"?

Our name is a tribute to Guy Stewart Callendar (1898-1964). A steam engineer with a knack for meteorology, Callendar was the first to document rising global temperatures and links this trend to growing CO_2 concentration. He worked tirelessly his entire life to warn about the consequences of this warming. Our logo is inspired by the evolution of average temperatures between 1880 and 1935 as published in 1938 in his visionary article *"The artificial production of carbon dioxide and its influence on temperature"*.

Our vision

Eighty years later, the time for warnings has passed. The effects of global warming are already clear and, whatever efforts we make to reduce greenhouse gas emissions, they will continue to worsen over the next decades.

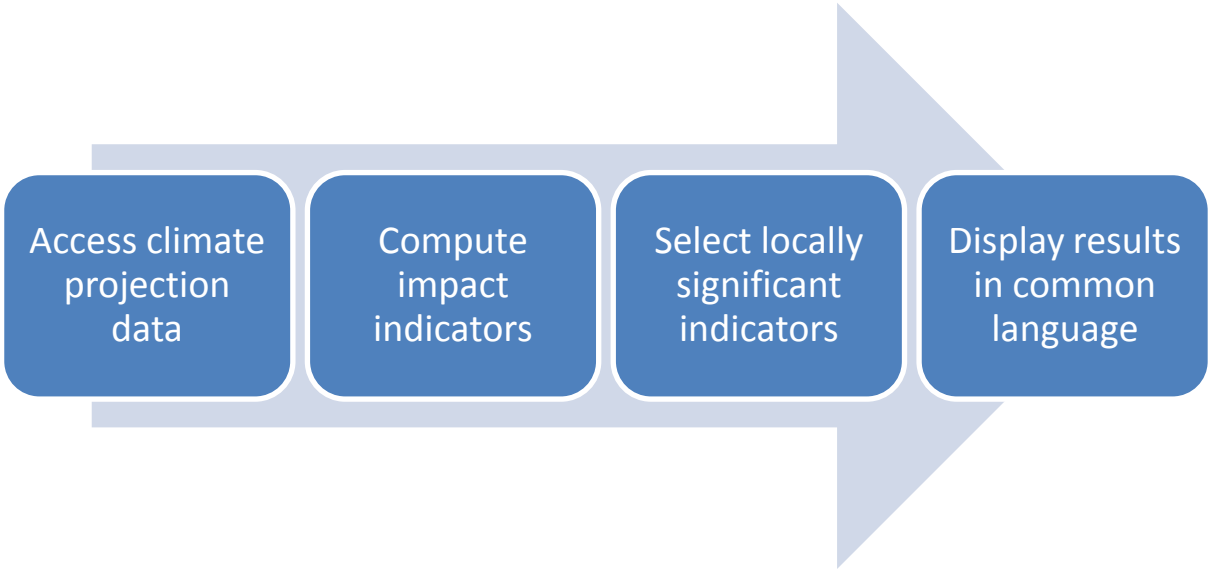
Tremendous amounts of scientific work have been done to model earth's climate and anticipate its ongoing evolution. We think these data are vital to inform long-term decisions made by companies, communities and even individuals: even though most of these decisions are too small to justify an investment in an expensive expertise, collectively they will determine the resilience of our societies in the face of climate change. We believe that artificial intelligence and data science offer solutions to provide access to projections of the local impacts of climate at dramatically lower costs and thus help mainstream climate adaptation.

What we do

Callendar helps organizations and individuals adapt to climate change by developing innovative solutions to facilitate access to scientific data, understand local risks and mobilize existing expertise.

Climate projections **for everyone**

The first step of any adaptation project is to gain access to scientific information on climate change at the relevant scale in both space and time. We help accelerate this process with tools to search data, calculate indicators, assess their significance and translate them into everyday language. Our technology empowers users without prior knowledge to exploit high definition climate projections from most institutions and modelling laboratories.



We continue to invest in research and software development. Our next goal is to create intelligent prioritization algorithms that can predict meaningful indicators for each user in order to produce more relevant, synthetic and localized reports.

An application for the general public

You want to know the future climate of any place in mainland France? Just send your question to @BotCallendar.

Behind this user, a web application will interpret your request, use a simple version of our tools to calculate the answer and then send it to you.

During the first week of its inception, in January 2019, this service received more than 500 requests. This success demonstrate a strong appetite for climate projections and allowed us to test our tools on a large scale.

How to get **simple data** for complex problems

Our goal is to help you make the right call in any situation where current or future climate is a parameter. We can support your decision making process with fast, bespoke and operational insights thank to methodologies and tools designed to combine the agility of a start-up with standards of good scientific practices.

1. Understand your question and define relevant indicators

To help you solve a problem we must first identify with you the data you need to crack it. We will tailor indicators to your activity and your needs; they can go from simple to the most complex: heat-related loss on an industrial steam turbine, maximum monthly average water level in a dam, spatial distribution of weather patterns favourable to Aedes aegypti mosquitoes…

2. Evaluate the transfer function

Once your indicators are defined, we need to understand how they react to climate variables, such as temperature and precipitation. Our approach of this question is unique: we evaluate how indicators evolved in the past, from actual data whenever possible or by recalculating them, and then we use an artificial intelligence algorithm to discover links between this series and historical climate data. This approach reduces the need for long bibliographical studies or theoretical modelling work and allows us a great reactivity.

3. Access climate data and compute

We have access to hundreds of climate projections from some twenty research institutes around the world. Based on these data and the transfer function between the climatic variables and your indicators, established in the previous step, we can produce the results you need. As we do not depend on any particular organism, we have the freedom to use all the data available to assess the robustness of the results and as we master all the modelling and calculations steps we can quickly study modify and re-run them to study new cases or different assumptions based on your needs.

4. Deliver high-value results, tailored to your processes and tools

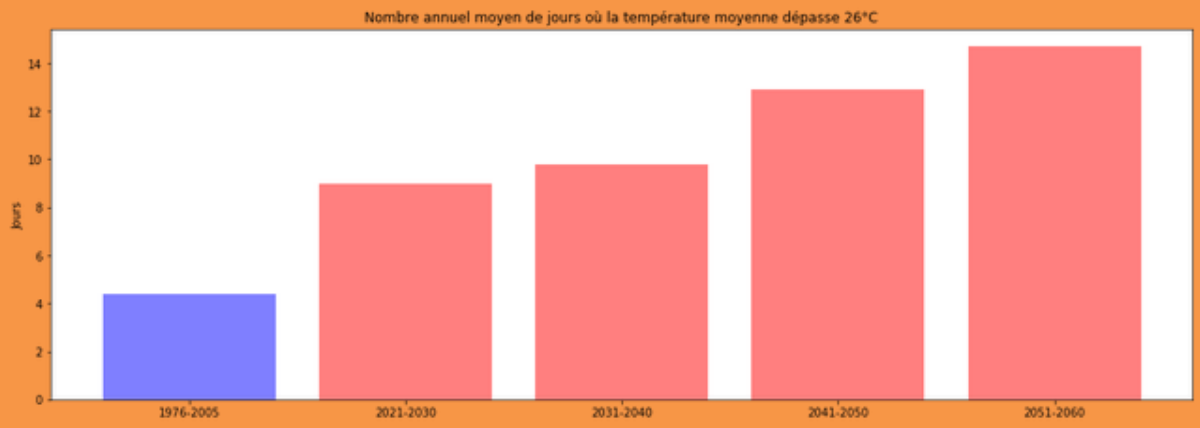
In order to provide you with immediately exploitable and operational results, we adapt them to the time scale and spatial resolution required by your activity. We also make sure that all data are delivered on physical medium (hard drive, download…) and in a format (for instance .xlsx or .csv) adapted to your situation.

Case study

For the last two decades, European electrical power plants have seen their operations disrupted by unusually hot climatic conditions during summer. In this case study, we assess the **impact of global warming on a nuclear reactor's availability**. The indicator we want to evaluate is the average number of outage days due to heat per year, for each decade from 2020 to 2060.

We start by listing past outages due to excessive heat. Matching these periods with meteorological records at the power plant, we find a strong correlation between shutdowns and days where the daily average temperature reach 26°C.

We then use projection data to estimate the number of days hotter than 26°C during the next four decades. To ensure meaningful results, we choose a **dataset with a high spatial definition (8x8km)** and consider only the temperature at the data point closest to the power plant. This projection shows that the probability of heat-related outage has already increased significantly:



Between 2021 and 2030, the number of days above 26°C is projected to be twice higher than during the reference period (1976-2005). And it continues to grow afterward: by the middle of the century it may be multiplied by 3,3.

This projection allows us to evaluate the **financial and operational impacts of climate change** on this reactor: using the operators' data, we can now quantify production losses, their costs, and their implications for the supply-demand balance on the grid and assess the need for back-up.

The next step of our study is to compute the spatial distribution of temperatures in order to determine whether or not other power plants are at risk. You can check the results and discover other case studies, at: **www.callendar.climint.com/case**

You are:

An individual

Discover our free tools at: www.callendar.climint.com

A government, an official or a community

Use our solutions to create your planing documents (NAPs, local adaption plan…)
Offer a localized version of our tools to your constituents on your own website

A company

Assess the implications of climate change on your activites and infrastructures
Raise awarness and detect your vulnerabilities with our workshops

A bank or an investor

Use our data to assess climate risks in prospective investments
Take avantage of our know-how in automation to evaluate exposure of large portofolios

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CALLENDAR
Climate intelligence