

PHYSICAL CLIMATE RISKS ADAPTATIONS & ACTIONS



SUSTAINABILITY TEAM

Garanti BBVA measures and monitors its physical climate risk exposure by using methods compliant with international standards, and in accordance with the applicable legislation. The Bank’s physical climate risk management strategy, policies and implementation procedures, and the tools and models employed for physical climate risk management are reviewed within the framework of regulatory changes and the Bank’s needs.

A context specific plan to adapt

Hydroelectric Energy Power Plants	
General	<p>Develop improved hydrological forecasting techniques and adaptive management operating rules.</p> <p>Develop basin-wide management strategies that consider the full range of downstream environmental and human water uses.</p> <p>Restore and better manage upstream land including afforestation to reduce floods, erosion, silting, and mudslides.</p> <p>Analysis to estimate likely range of projected climate variations over hydro lifetime.</p> <p>Identify cost-effective designs (new plants) and modifications (existing plants) to deal with specific risks identified for the site.</p>
Precipitation (including drought)	<p>Increase storage capacity</p> <p>Increase dam height and/or build small dams upstream (if flow is expected to increase).</p> <p>Construct or augment water storage reservoirs.</p> <p>Modify spillway capacities and install controllable spillway gates to flush silted reservoirs.</p> <p>Adjust water release schedule to maximize generation</p> <p>Modify number and type of turbines more suited to expected water flow rates.</p> <p>Modify canals or tunnels to handle expected changes in water flows.</p> <p>Optimize reservoir management and improve energy output by adapting to changes in rainfall or river flow patterns.</p> <p>Improve short term water flow forecasts.</p>

<p>Extreme events (including floods)</p>	<p>Design more robust dams and infrastructure for heavier flooding and extreme events.</p> <p>Design for increased flows from glacier melting.</p> <p>Increase storage capacity and enhance defense structures for dams and turbines.</p> <p>Adjust water management to retain surplus storage for excess water.</p> <p>Organize debris removal.</p>
<p>Higher air temperature, wind speeds, and humidity</p>	<p>Construct or augment water storage reservoirs.</p> <p>Increase storage capacity, if possible, to retain more water from high flow yields.</p>

<p>Wind Energy Power Plants</p>	
<p>General</p>	<p>Develop meteorology-based weather/climate forecasting.</p>
<p>Wind speed (Changes in the wind speed effects the output)</p>	<p>Design turbines able to operate with and withstand higher wind speeds, gusts, and direction changes.</p> <p>Install taller towers to capture stronger winds at higher altitudes.</p> <p>Choose sites that consider expected wind speed changes during the lifetime of the turbines.</p> <p>Consider developing and commercializing vertical axis wind turbines (more output; can operate in wider range of wind speeds).</p>
<p>Air temperature (Changes in the temperature effects the output)</p>	<p>Consider effects of extreme temperatures on turbine and blade selection and operation.</p> <p>Account for icing in blade design.</p> <p>Install blade heating.</p> <p>Consider extreme temperature ranges in turbine material and lubricant selection.</p>
<p>Extreme events (Damage the infrastructure)</p>	<p>Insure against impact of storms on long-term power yields and damage.</p> <p>Ensure presence of rapid emergency repair teams.</p> <p>Apply enhanced lightning protection and grounding.</p>

Solar Energy Power Plants	
General	Develop meteorology-based weather/climate forecasting.
Temperature increases	<p>Improve airflow beneath mounting structure to reduce heat gain and increase outputs.</p> <p>Specify heat-resistant PV cells and module components designed to withstand short peaks of very high temperature.</p> <p>Install passive cooling (natural air flows) for photovoltaic panels or apply active cooling by forced air or liquid coolants.</p>
Precipitation increases	<p>Select appropriate tilt panel angle to clean dust.</p> <p>Select module surface conducive to self-cleaning.</p> <p>Choose locations with lower probability of dust, grit, snow if practical.</p>
Wind speed; Turbidity	<p>Design structures to withstand higher winds.</p> <p>Assure free space (panels & mounting) so snow can slide off panel.</p> <p>In dry areas, consider panel rinsing system to remove dust and grit.</p>
Extreme events (flood, typhoons, drought)	<p>Specify stronger mounting structure.</p> <p>Specify cabling and components that can deal with high moisture content and flooding.</p> <p>Use reinforced glass for flat plate collectors to withstand hailstones.</p> <p>Strengthen the surface of evacuated tube collectors.</p> <p>Increase protection of all solar equipment beyond current standards.</p> <p>Increase lightning protection of the site and the panels.</p>

A new context specific plan, which will be declared to the public, was developed to provide adaption of physical climate risks in existing and/or operations. The risk assessment contains also analysis of Bank's all buildings. The scope of the risk assessment and plan includes adaptation of physical climate risks is 100% share of the Banks's existing operations. The plan includes a target to implement relevant adaptation measures within the less than 5 years for existing operations and it will apply to new operations.

Garanti BBVA's own operations	
General	<p>Increase awareness to climate change by workshops and education.</p> <p>Change governance; consumption, behavior etc.</p>
Water scarcity and droughts	<p>Reduce the demand by water-saving appliances in households and buildings.</p> <p>Reuse water.</p> <p>Establish water-saving behaviors.</p> <p>Change production using less water.</p>
Temperature increase, drought, heatwaves	<p>Change building design: passively cooling by isolation, shadowing, natural ventilation.</p> <p>Change behavior: work in the cooler hours, stay in cool places, drink more water, slow down physical activity.</p>
Floods	<p>Place infrastructure on higher grounds.</p> <p>Retreat from low-lying, potentially flood-prone areas.</p> <p>Develop infrastructure that can be temporarily flooded without any damage (non-sensitive use of ground floors and basements).</p>

Garanti BBVA puts responsible and sustainable development in its focus and develops innovative practices to respond to its stakeholders' expectations. In this aspect, the Bank coordinates the related climate risk management units/ functions to determine the needs for climate risk management of operations and to ensure that required studies and reports are managed.