



## Just Transition: Quality Infrastructure for Climate and Environmental Protection

Global climate change affects us all. Its impact can be felt and measured worldwide for example in the form of record temperatures and precipitation. People in developing and emerging countries are particularly vulnerable to extreme weather events. In order to successfully counteract climate change and its effects, humankind must collaborate to establish an economic and social order that is environmentally friendly, climate-neutral and at the same time socially just (just transition). As part of German development cooperation, PTB supports its partner countries on this path.

Consistently collected, reliable and comparable environmental data is required for an inventory and ongoing monitoring of the state of the environment and climate, including forecasts based on this data. To ensure this, quality assurance mechanisms must be established and applied. A demand-oriented quality infrastructure provides essential services such as uniform standards, measurement and testing methods as well as product and process certification, and thus significantly contributes to just transition.

# Initial Situation

Changes in the global climate will fundamentally change living conditions around the world. Rising temperatures, unpredictable precipitation regimes and an increase in natural disasters such as droughts and floods will shape the climate of the future. Regions that have historically contributed the least to greenhouse gas emissions will be disproportionately affected. Economically disadvantaged segments of the population and marginalized groups such as women, children and people with disabilities are particularly vulnerable to these events. The countries of the Global South are facing a double challenge: With limited resources, measures must be taken both to adapt to and to mitigate climate change.

All 17 goals of the Agenda for Sustainable Development are threatened by climate change. Goal 13 therefore explicitly commits the international community to *[taking] urgent action to combat climate change and its impacts*. In the strategies of the German Federal Ministry for Economic Cooperation and Development (BMZ), this is reflected in the core areas of *Climate and Energy, Just Transition* and *Protecting our Natural Resources* with their associated fields of intervention.

Decoupling economic growth from resource consumption is essential for sustainable and climate-friendly development. Circular economy approaches and carbon-neutral production processes, for example, are progressive in this regard. To this end, it is necessary to increasingly use energy from renewable sources and to implement energy efficiency measures. All these developments require monitoring and support through quality assurance measures such as harmonized standards and technical regulations, traceable certifications and labels, comparable measurements and tests. These elements are also of particular importance for transparency and fair access to the benefits of new technologies and economic innovations.

To protect the environment and human health, limit values for emissions and pollution are set worldwide in national regulations or in the recommendations of international organizations, such as the World Health Organization (WHO) for drinking water and air quality and the Food and Agriculture Organization (FAO) for food and soil. In many countries of the Global South, however, it is not possible at all to monitor and enforce such protective regulations in a legally compliant way due to a lack of measurement and testing capacities. Regulations therefore only exist on paper or are politically adopted from international agreements but cannot be technically implemented. It is therefore necessary that methods of data collection and evaluation are standardized and comparable to ensure that measurement data is reliable

and legally compliant. This must also be ensured for climate monitoring, so that data from different countries and continents can be sensibly consolidated. In many places, this is not yet the case, which contributes significantly to the uncertainty of global climate models. However, the most precise observations and predictions possible are necessary in order to effectively protect the population from the impacts of climate change.

A functioning quality infrastructure (QI) can make important contributions in all these areas and is therefore necessary to successfully achieve a just transition. QI supports this change at both regulatory and technical levels as well as by creating transparency and trust, for example by providing comprehensible environmental data or uniform and comparable product labels for consumers. Efficient QI is therefore one of the fundamental prerequisites for the active participation of emerging and developing countries in overcoming environmental and climate challenges, both at the national level and in a global context.

# Our Contribution

In international cooperation, PTB focuses primarily on strengthening the expertise of its partner institutions. On the one hand, these are the ministries and authorities that are responsible for environmental and climate issues, which are supported primarily through strategic advice and raising awareness for the importance of quality infrastructure. On the other hand, PTB supports the development and expansion of QI services at a technical level. This is a system consisting of standardization, metrology (measurements and verification), accreditation, conformity assessment (testing, inspection, certification) and market surveillance as well as the associated public and private institutions, services, regulations and policies. In principle, QI is a cross-sectional task that contributes to ensuring the quality, safety and environmental compatibility of goods, services and processes. In the case of climate and environmental protection, for example, QI elements are particularly relevant. Examples:

- Standards represent the current state of technology and consist of a consensus among interested parties on a specific topic. Procedures for measuring, calculating or reporting CO<sub>2</sub> emissions must be standardized, so that the data is comparable and can be integrated into global climate models, for example. When calculating emissions for emissions trading or for assessing and levying charges, data must be collected in a comprehensible and legally compliant manner. Standards are the ideal basis for this, to which legisla-

tors can refer in their legal texts without having to specify technical details themselves. PTB supports standards institutes in its partner countries on the one hand in shaping national standardization processes as participatively as possible in accordance with international requirements and on the other hand in participating in the development of standards at the international level themselves.

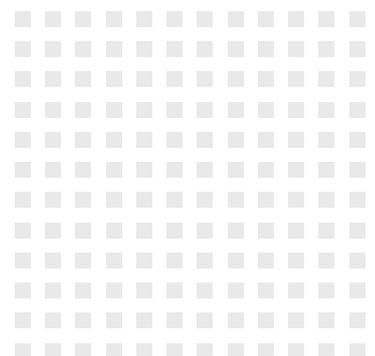
- Metrology is the science of measurement which strives to ensure the accuracy, reliability and traceability of measurement results. By comparing the measuring instruments used with references (instruments) of a higher order – a procedure known as calibration – it is ensured that these instruments measure correctly and reliably. Calibration must be repeated at regular intervals and is the only way to ensure that measurement data is comparable over time. Climate-related parameters such as temperature, humidity, solar radiation, wind speed, rainfall, the pH value and salinity of the oceans, etc. are measured simultaneously at countless locations around the world and can only be meaningfully compared or brought into a logical relationship with one another if the measurements have been taken with calibrated measuring sensors. As Germany's national metrology institute, PTB supports its partner institutions in emerging and developing countries in building up technical expertise for the calibration of measuring instruments. Due to the large number of different measurement quantities, careful selection and prioritization are necessary; regional approaches may also be recommended.
- The individual elements of conformity assessment (testing, inspection, certification) have different but in many cases complementary tasks and are usually carried out by independent, often private institutions. Certification affirms the conformity of a product, a service, a process or a person's qualifications with a specified requirement (e.g., a standard). In the case of greenhouse gas emissions, this could be verifying a company's carbon footprint or certifying the climate neutrality of products or processes. Examples of tests include analysing the composition of exhaust gases or water and soil samples. Quality-assured results from environmental analyses are essential for data-based environmental policy decisions and strategies, but also for the enforcement of regulations and for monitoring compliance with limit values. Common examples of inspections are those of vehicles and their emissions, exhaust gas separation systems in factories and the technical safety of power plants. Conformity assessment for the climate and environmental sector is part of the consulting and capacity building of PTB projects in its partner countries in the Global South.

- As an independent entity, an accreditation body determines the competence of conformity assessment bodies. It therefore has an important role to play in quality assurance within the QI system and, above all, in promoting confidence in the services provided. Like all other elements of QI, accreditation is defined by international standards and international networks, which is essential for acceptance across national borders and thus a prerequisite for trade and the mutual recognition of certificates, measurement and test results, etc. PTB advises national accreditation bodies and supports them in expanding their competence.

## The Impact of our Work

By promoting quality infrastructure in partner countries of the BMZ, PTB contributes to the provision of demand-oriented, competent and internationally recognized services for environmental and climate protection. Within PTB's projects, QI institutions in the partner countries are not only supported in establishing and expanding their competences, but they also engage in comprehensive awareness-raising and networking measures.

With this in mind, extensive investigations into the supply of and demand for QI services for environmental and climate issues, particularly with regard to water and soil, have been carried out within the scope of PTB projects. Through publications and various events, the QI institutions are made aware of their important contribution to climate protection. PTB's support also contributes to achieving a better link between the national QI and the technical environmental monitoring authorities. Many PTB projects accompany national and international standardization processes. For example, various climate-relevant standards for soil and water quality have been developed in Guatemala with PTB's support.



Cooperation with other national metrology institutes, as sister organizations of PTB, plays a central role in our work. In addition to the development of basic metrological capacities, specific new services for climate monitoring and environmental analysis are being established. The levels of new environmental pollutants (e.g., residues from agricultural and industrial production, pharmaceuticals or microplastics, etc.) are constantly rising. Corresponding limit values for the residue quantities must be determined and measured in extremely low concentrations. Measurement uncertainty and accuracy are thus playing an increasingly important role. PTB transfers measurement methods that have been tested in Germany and Europe to the partner countries of German development cooperation. In Indonesia and Peru, for example, the measurement capacities of the national metrology institutes for air and water analysis are being improved with advice from PTB. In Tunisia, PTB has successfully supported the establishment of a laboratory for wind speed measurement, which will help the country with its energy transition.

PTB projects also support testing laboratories in offering new services in the context of environmental and climate protection, which puts them in the position to test nationally defined emission and pollution limits. With this support, the number of analysed parameters and accredited laboratories can be increased. For example, water monitoring of India's sacred Ganges is being improved within one of our cooperation projects. And as an important backbone for reliable laboratory analyses, PTB is supporting providers of interlaboratory comparisons and reference materials for environmental parameters in Indonesia, among other things, to expand their range of services. Depending on national requirements, all these service providers can or must be accredited by an independent body to prove their competence. PTB-supported accreditation bodies in the countries of the Association of Southeast Asian Nations (ASEAN) are provided with advice and training to enable them to expand their range of services and meet the demands of both the governments and export-oriented businesses.

An important stakeholder and a critical driver of demand for quality infrastructure services is the private sector. For this reason, PTB projects specifically seek dialogue with businesses and their associations. These include, for example, industries with potentially harmful emissions in Indonesia, but also com-



Climate monitoring station

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panies in value chains that are relevant to biodiversity in Peru. Such advisory services support them on their path to a more sustainable economy. By supporting quality infrastructure in the field of climate and environmental protection, the partner countries have more reliable mechanisms and data for political decisions. This facilitates the implementation of international agreements such as the Convention on Biological Diversity and the Framework Convention on Climate Change. Governments can effectively fulfil their obligations relating to environmental and consumer protection. Businesses benefit from reliable and recognized conformity assessment services, which are necessary for sustainable management and innovative products or services (e.g., export of biodiverse products, environmental management and carbon footprint certifications and product labelling).

Quality infrastructure can't fix everything,  
but without it, you can't fix anything.