

## **Assessment of costs and benefits in power-engineering and building construction on Russian territory**

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Significant part of the Russian territory is located within the region of maximum climatic change, both observed and predicted. The positive and negative consequences of climate change vary largely for different regions of Russia and can impact differently on diverse economy sectors. Thus when working out a national adaptation strategy, it's necessary to take into account the whole spectrum of losses and gains.

Main Geophysical Observatory (MGO) is a scientific unit of Roshydromet that identifies impacts of climate change on infrastructure including energy sector, transport, oil and gas pipelines, and building construction and estimate costs and benefits of adaptation options on the basis of risk assessment and probabilities. MGO fulfills this research over a long period of time together with end users. As a result the systems of specific climate indexes or impact indexes were created. Expected deviations of these indexes express objective change of climate conditions and can be used in response to basic problems of applied climatology including the initiation of special measures.

Among most negative consequences of expected climate change for infrastructure in Russia is an increase in the recurrence, intensity, and duration of dangerous weather events and anomalous climate conditions. Therefore in MGO various approaches to climate-related risks assessment for different industry sectors are analyzed and acceptable risk values are estimated. There under different risk management scheme can be considered.

When climate-related risk exceeds specified permissible value, it's necessary to take adaptation measures. As to hydro - meteorological services, these measures include:

- early warning about dangerous weather events;
- monitoring of anomalous climate conditions;
- changes of building Standards and Codes taking into account over-normative loads.

Over-normative loads arise in the following way:

- building standard has changed because of using more accurate climate information but some constructions were built according to obsolete standard;
- climate change (e.g. climate hazards frequency or climate anomalies have risen), but building standard does not register this change;
- constructions grow old because of the atmospheric loading, and their durability shortens.

In Russia over-normative loads are especially dangerous to nuclear power industry, pipe lines and building construction. In the future over-normative loads are expected to increase. Considering this tendency additional investigations were conducted in order to estimate costs and benefits of adaptation measures in mentioned sectors.