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CHANGES TO FRESHWATER SYSTEMS AFFECTING ARCTIC INFRASTRUCTURE AND NATURAL RESOURCES

Arne Instanes (*Instanes Polar AS, Norway / University Center in Svalbard, Svalbard*)

Vasily Kokorev (*State Hydrological Institute, Russia*)

Richard Janowicz (*Yukon Department of Environment, Whitehorse, Canada*)

Oddbjorn Bruland (*Multiconsult AS, Norway*)

Knut Sand (*Statkraft Energi, Norway*)

Terry Prowse (*University of Victoria, Canada*)

arne@instanes.no

As part of the international scientific assessment, the *Arctic Freshwater Synthesis*, a resources component was included to focus on the potential impact of future variations and change in water resources and the Arctic freshwater system on Arctic infrastructure and exploration and production of natural resources in the Arctic. This includes assessing the impacts on: i) infrastructure related to municipalities and human settlements, ii) transportation networks; roads, railroads, airports and harbors, iii) hydropower industry, iv) mining industry, v) oil and gas industry.

Climate change may influence the hydrological cycle and change the amount and type of precipitation and seasonal distribution and timing and rate of snowmelt. Inland dams, water reservoirs and diversions together with variations in climate, may cause major impact on future water quantity and quality in the Arctic. This will affect the fresh water resource and water availability at downstream municipalities and settlements.

It is likely that climate change will increase high latitude precipitation in proportion to increases in mean hemispheric temperature. In addition, a warmer climate makes access to many land areas in the Arctic more difficult due to earlier melting of river and lake ice and later freeze-up. Shorter seasons where ice and snow roads can be used and shorter season available for tundra travel, severely impact communities and industry that rely on land transport of goods to maintain reasonable retail costs and ensure economic viability, particularly in northern Canada, Alaska and Russia. On the other hand, a warmer climate presents new opportunities in the Arctic. Some land areas may become more accessible for industrial activity such as oil and gas exploration, mining and hydropower development, as sea ice, glaciers and ice caps recede. This is especially important in Greenland, Svalbard and some coastal areas bordering the Arctic Ocean.

The resources component of the *Arctic Freshwater Synthesis*, presents the role of fresh water systems related to Arctic infrastructure and naturel resources in the Arctic. Observed and projected changes related to Arctic infrastructure and industries are reported. Finally, adaptation strategies and engineering design requirements for a changing climate are discussed.