



Process-based modelling of regional water demand for electricity, industry and municipal sectors in Integrated Assessment Models.

David L. Bijl (1), Patrick W. Bogaart (1), Tom Kram (2), Bert J.M. De Vries (1), Detlef P. Van Vuuren (1,2)

(1) Copernicus Institute for Sustainable Development and Innovation, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands, (2) PBL Netherlands Environmental Assessment Agency, PO Box 303, 3720 AH Bilthoven, The Netherlands

Integrated Assessment Models (IAMs) are a prime tool for studying global scale interactions between the human and natural earth systems. Our research contributes to this field by modelling water, food and energy demand as outcomes of more physical processes and by adding links between them. As part of this ambition, we here describe a model for water demand in the electricity generation, industrial and municipal sectors, going beyond previous modelling efforts. For instance, by coupling water demand to energy inputs, the model directly couples water efficiency to fuel efficiency of power plants.

We present electricity, industry and municipal water demand models and develop water demand projections for the new Shared Socio-economic Pathways (SSPs) and Representative Concentration Pathways (RCPs) for climate research. Our regional-level demand models contribute to understanding the extent of crossing planetary boundaries and the scope for solutions such as virtual water trade or efficiency improvements. We also discuss how we plan to link demand and supply models, and how the usefulness for policy makers can be increased.