# Towards sustainable polder management

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The Dutch have been defending themselves against the water for a very long time. They began draining the land and pumping the water out with windmills centuries ago. Nowadays these pumps run on electricity or diesel, but their task is exactly the same. They are required to operate long hours to keep the land dry. These long operating hours cost a lot of energy. The operating times and power consumption depend on the target polder water, the (tide-varying) water level at the pump outlet, and of course the weather forecasts. Combining this information, it is possible to compute the optimal pumping schedule by using model predictive control technology. This technology, apart from the weather predictions, is using a simple model of the hydraulic system and able to calculate the optimal actions at every time step. The predictions are also constantly updated, just like the model prediction and the suggested pump operation. The research project „Slim malen" aims to answer questions such as: How to choose the operating hours so that the polder water level is kept always within the allowable margin, but the pumps are consuming the least energy? How to minimize pumping costs without compromising safety? How to do that when we talk about a system of 20 pumps or more? These are the question that the project „Slim malen" addresses. The project is a cooperation between Deltares and Eindhoven University of Technology, involving the private sector, research institutes, and water boards and ties in with recent developments in methodology and software at Deltares.