MARIN recognises the need for alternative and sustainable energy sources. The new Renewable Energy Team (adjacent page) has already been applying their tools and experience to the design and hydrodynamic analysis of water turbines.

Sustainability and renewables - a key focus

Worldwide energy demand continues to grow, but at the same time, oil production is projected to peak in the period between 2010 and 2015. In the search for sustainable energy resources, hydropower appears to be one of the most important sources of renewable energy. In countries with high-gradient rivers, very significant portions of their electricity demands can be met by exploiting the potential energy of rainwater. Today, the kinetic energy of more slow-moving water currents is being investigated as a source of generating green energy.

Energy contained in water currents is proportional to the third power of the speed of the water (mass flow rate times the velocity squared). Any significant power harvest thus requires water streams to flow with a sufficiently high velocity.

Impeller design In hydropower applications, water turbines are used to convert the energy contained in the water into power on the electric generator. The 'Kaplan' type, axial flow turbine applied in many hydropower plants is in essence similar to the typical ducted ship propeller. It is therefore not surprising that MARIN has been asked in some cases to design the impellers of these turbines.

In other developments such as the 'shrouded tidal turbine', very familiar hydrodynamic solutions are seen such as the application of water- accelerating venturis to maximise the flow rate passing through the turbine. This is of course, very similar to the flow-accelerating 'Kort' nozzle augmenting the propulsion of ships.

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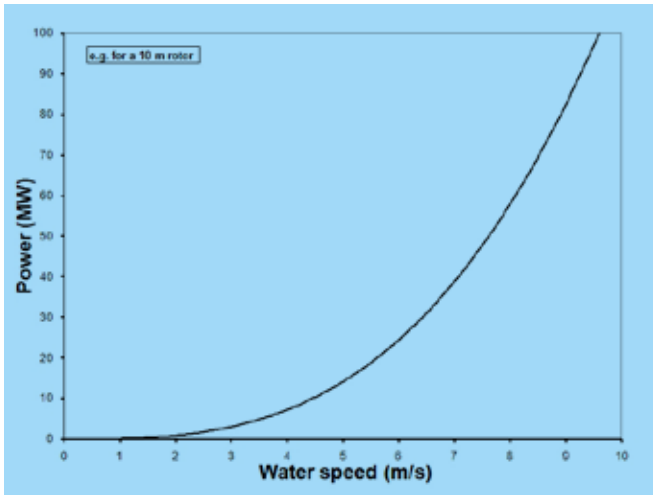

Power contained in a water stream as a function of the flow velocity

Tidal turbine