



PROJECT NO: FP6-017941

WaterWingPower

Enabling renewable energy SMEs to develop submersible and cost-effective vertical axis turbines for energy exploitation in ultra low-head streams.

Co-operative Research (CRAFT)

Horizontal Research Activities Involving SMEs

Publishable final activity report

Period covered:	December 2005 to July 2008
Operative commencement date of contract:	1st November 2005
Project Duration:	33 months
Project end date:	31 st July 2008
Date of issue of this report:	September 2008
Project Coordinator:	Water Power Industries AS
Document revision:	00

Objectives

The overall project objective is to develop an efficient, cost effective, free stream, vertical axis hydro power turbine exploiting 90 % of the theoretical available kinetic energy in rivers primarily.

Contractors involved

Participant name	Country
Water Power Industry	NO
All Motion Technology	SE
Technosoft International	RU
Brødrene As	NO
GreenChoice	NL
IMPress Sensors & Systems	UK
Indar Máquinas Eléctricas	SP
Buskerud Kraft Produksjon	NO
Teknologisk Institutt	NO
PERA Innovation	UK
The Gdansk University of Technology	PL
Institute of Energy Technology	NO
Scan-Sense	NO

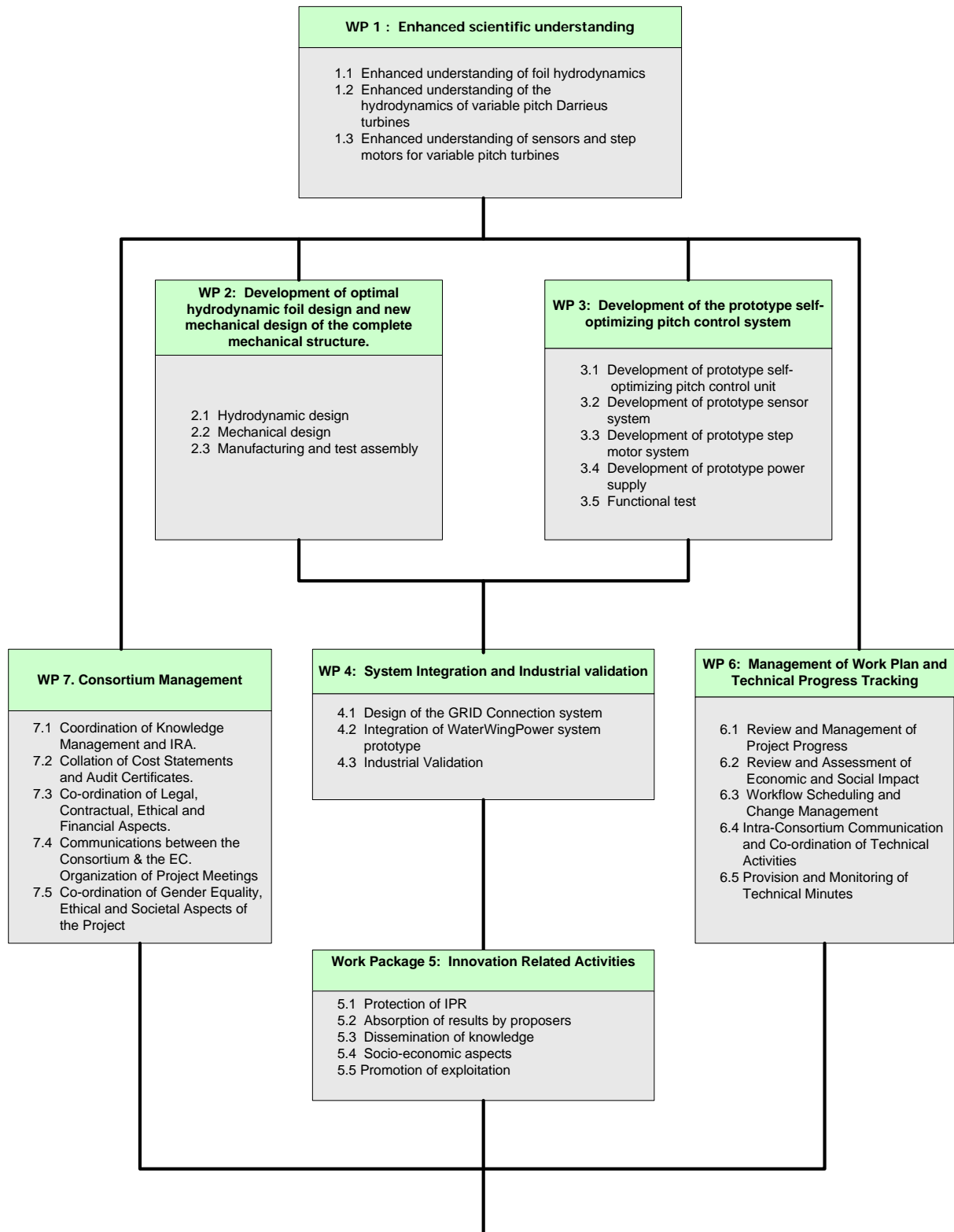
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Project web site

www.waterwingpower.com

Work performed



Results

The complete turbine concept has been researched.

A complete prototype turbine with a rotor diameter of 1,5m and a depth of 2,0 m was designed, built and tested successfully, even producing electricity on the public grid.

The efficiency of the turbine was measured to approximately 47%, which is 80% of the theoretical maximum of 59%.

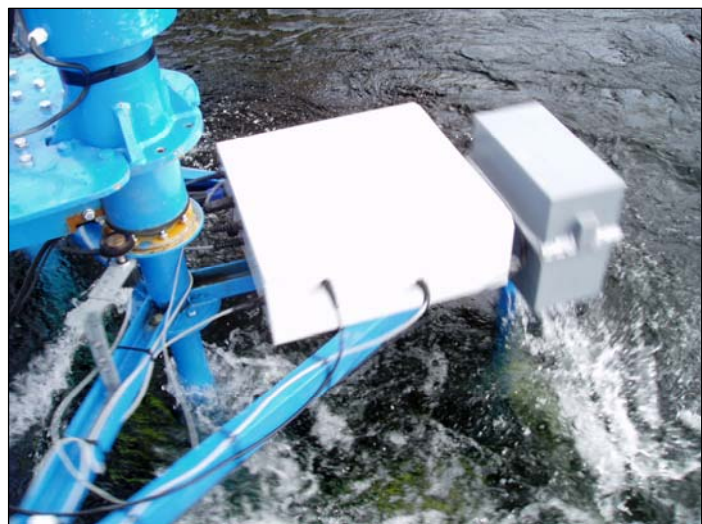


The knowledge, prototype designs and parts produced, forms the base for commercial deployment.

Fulfillment of project objectives

To a high degree we fulfilled our initial objectives. We came a bit short in a few areas, but surpassed them in other areas.

We were not able to field test the self optimizing mode of the control system due repeated problems with one torque sensor. In this mode the control system is able to optimize the foil movement with respect to turbine power output. We however tested this in computer simulations.



We measured a turbine efficiency of 47% compared to the targeted 53%. We believe we could have closed a significant portion of this gap with the self optimizing control system. Although we did not reach the perhaps overly ambitious goal of 53%, we have proved that we have a very competitive technology.

In other areas we surpassed our objectives. We for example designed, implemented and tested a turbine producing electricity on the public grid due to the added marketing value of such a demonstrator.

Comparison to state of the art.

To our knowledge our technology now represents the state of the art in two important areas of free stream water turbines.

Firstly we have the highest hydrodynamic efficiency due to optimized hydrodynamics and our pitch control system.

Secondly we have the lowest energy production cost due to our relatively inexpensive concept.



Impact and Intentions for use

Our project is aimed at laying the foundation for a commercial turbine family that will be marketed and sold by WPI AS. The interest in the renewable energy sector is very high and expected to rise with the current political climate.

Following this project there is also plans for developing a turbine technology suitable for small hydro application and for tidal and marine currents turbine parks.

The turbine technology is environmental friendly, renewable and able to produce energy at a competitive price estimated to 0.03 - 0.06 €/kWh. The global market and the potential contribution to the production of renewable energy is huge.

At the time this document was written two turbines have been sold and several others are being negotiated.