SMART MICRO HYDROKINETIC POWER PLANTS

(NEW PORTFOLIO IN RENEWABLE ENERGY MIX)

APPLICATIONS IN CANALS USING EXAMPLE OF COOLING TOWERS IN THERMAL POWER PLANT
SMART HYDRO POWER: the Company

Shareholder:
- Kolmsee family 36%
- eCapital (VC fund) 35%
- KfW (German development bank) 12%
- HTGF (private/public) 12%
- Private investors 5%

Smart Hydro Power designs, builds and commercializes kinetic hydro power plants for distributed generation.
Pilot Project: 20 kW (4x5kW, Axial Flow)

- Installed in running water w/o plant shutdown in cooling canal of Mining Company.
- Plant is Grid synchronized, Plant load factor above 70%.
- Renewable base load supply 365x24x7.
- Four axial flow hydrokinetic turbines in an array.
- Smart power evacuation with automatic braking system eliminating operational fatigue.
- Generation Costs of < 0.04 U$ / kWh
Hydrokinetic Power

- 5 kW sealed underwater permanent magnet generator which is gearless driven by three blade rotor.
- Output up to 600 V chaotic AC, necessary rectifier-inverter in line.
- Output velocity dependent.
- Power curve – power as function to velocity .5 kW @ 3.1 m/sec.
- Cost-efficient, renewable base load solution
Site specific Structure: Easy Installation
Power Injection low Voltage in local Grid
Smart Power Evacuation
Technical Optimization

• Flow velocities highest in center decreasing towards side walls. Require fine tuning of individual turbine in array varying sweep dia.

• Wake of individual turbine interfering with each other. Application of diffusers required.

• Installation structure needs to be hydrologically optimized to reduce turbulence – use rounded steel.

• Blockage leading to level rise upstream of project. Floating model with reduced no of turbines per array to be adopted for extraction of maximum power out of canal with minimal level rise.
Future of Distributed Generation
Market Potential Distributed Generation

Use existing infrastructure and add generation capacity at costs 3 to 5 U$ ct per kWh (depending on flow)

• Tail races of existing hydropower plants

• Cooling canals of thermal power plants or chemical plants

• Irrigation canals with velocity >= 2 m/s

• Natural rivers with more than 3 m depth (in dry season) and >= 1.5 m/s average velocity mainly for rural electrification (higher costs for off grid installations)
Contact

Smart Hydro Power GmbH, Germany
Dr. Karl Kolmsee
karl.kolmsee@smart-hydro.de
www.smart-hydro.de