

# Feature section

## THK's water-powered generating system

# Carving out a new future with technology and imagination

Light, heat, and motion, from flowing water

THK entered the field of wind-powered generation in 2009 when it launched an internal project aimed at developing key components for wind turbines. Exploring new uses for the technology developed in that initiative, THK has now applied it to water-powered generation. Following an initial test in Taiwan in 2012, THK tested its new system at the Kanagawa Prefecture Sagami River Left Bank Land Improvement District in 2014, continuing its campaign to help unleash the vast potential of renewable energy.

### THK technology stands out

The use of irrigation canals for water-powered generation is relatively new. There are strict limitations on the extent to which irrigation canals can be modified, since any obstruction of the water flow would have a major negative impact on the crop being watered. For conventional water-powered generation, falling water must be devised, which enables large volumes of power to be generated but requires major construction work that often costs at least ten times as much as the generating equipment itself.

THK's system, which generates electricity by means of a water wheel alone, costs relatively little and neither damages nor obstructs irrigation canals. Since it doesn't require damming the flow to create falling water, there's little likelihood of flooding, and refuse and other floating matter can easily be cleared to permit stable operation.

### Imaginative technology contributes to revitalization

With a water-powered generating system that does not rely on falling water, power is generated most efficiently in a stable environment: a constant volume of water flowing at a constant speed. That's why THK decided to focus on irrigation canals.

Farming is dependent on rain. Droughts and poor harvests take their toll, and the incomes of people who work in agriculture are dependant on climatic conditions. THK is both pursuing growth in the field of renewable energy and trying to help people involved in agriculture achieve more stable incomes, thereby contributing to the "regional revitalization" movement. With the cooperation of the Kanagawa Prefecture Sagami River Left Bank Land Improvement District, a two-month experiment was carried out in 2014 to verify the functions of THK's water-powered generating system and reveal any challenges posed by agricultural irrigation canals in Japan. The results demonstrated that no modifications to existing irrigation canals are required, that the system will not obstruct water flow, and that irrigation canals in Japan are capable of generating a stable supply of electric power.



Testing a water-powered generator.

### Trial use of water-powered generator in agricultural irrigation canal

System in place: August 21 to October 3, 2014

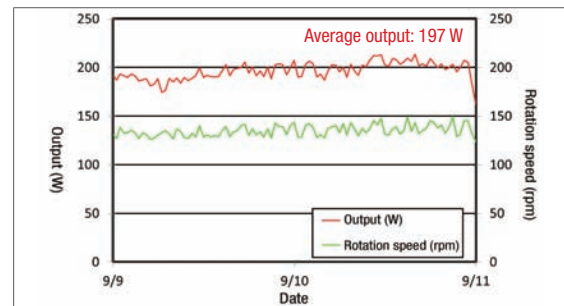
System in operation: August 26 to September 24, 2014

Location: Near Iriya 2-chome, Zama, Kanagawa Prefecture

Water intake area (m <sup>2</sup> )	0.3		
Blade length (m)	0.5		
Blade rotation diameter (m)	0.6		
Flow rate (m/s)	1.0	1.5	2.0
Output (kW)	0.03	0.1	0.24
Monthly output (kWh/mo.) (during 720 hours of operation)	22	73	173

Trial unit specifications

Overall efficiency:  $\eta = 0.2$



## Kanagawa Prefecture Sagami River Left Bank Land Improvement District

Ebina, Kanagawa Prefecture

### The great potential of renewable energy is worth the cost

As someone who works with irrigation, I've always thought people should be more aware of the importance of irrigation canals, and not just because they carry water, which is a source of life. I'm glad to have had the chance to help explore their potential through THK's project, because I think it will help the public better understand the ways in which canals can help improve living conditions.

When I got my first look at THK's water-powered generator, I saw right away that it wouldn't damage the canal or anything else, since the water wheel is the only thing that goes into the water. I knew this would be a valuable experiment. Ordinarily, hydroelectric projects require major construction work, so the simple design of THK's system was very appealing.

I work in agriculture, so I have a basic interest in protecting the environment. For the sake of the future, I feel we should be working hard to utilize renewable energy as a countermeasure against global warming, even if it's a little costly at present. Unlike solar and wind power, water-powered generation can be available 24 hours a day, provided you have a steady flow, so it has great potential as a source of renewable energy. If we put it to practical use, it could be used to run the systems that control automatic sluice gates, which we already have, so the power generated wouldn't necessarily just be sold off but could actually serve as an energy source on its own.

Agriculture and industry are two separate fields, of course, but both are devoted to producing things, so in that sense



Kazuhiro Shiowaki, engineer.

they're similar. I hope THK will put its industrial insights to good use in relation to agriculture and come up with some imaginative new ideas and technology. I really hope the system that was tested in 2015 will be perfected and put on the market. I'd like to see THK continue to develop ways to take advantage of the latent benefits of irrigation canals, and I hope people will learn about its efforts so far.

#### Kanagawa Prefecture Sagami River Left Bank Land Improvement District

In 1930 the Sagami River Left Bank Water Users Association was established for the purpose of providing canals and waste water treatment facilities to irrigate more than 2,000 hectares of paddies located in what is now the southern part of the city of Sagami-hara and the cities of Zama, Ebina, Fujisawa, and Chigasaki, as well as the town of Samukawa. In 1949, a new law was enacted reestablishing the organization as the Kanagawa Prefecture Sagami River Left Bank Land Improvement District.

