

Nasunogahara Aqueduct Water Park



【Description】

This Water Park is designed and constructed to contribute for expansion of renewable energy use and enhancement of environmental awareness through providing visual idea of potential energy source in neighborhood by setting small-scale-hydro power system. The Park is supposed to promote eco-energy education.

【The feature of Water Park】

- Exhibition of small-scale-hydropower system run by "Nasu Aqueduct", which is one of the three maj aqueducts in Japan.
- Lighting of the sidewalk sourced by solar and wind power; LED bulbs illuminate Aqueduct.
- The "Park Distribution Board" that enables power supply to Electric Vehcle.
- Training course under cooperation by the Nasunogahara-tochi-kairyoku-rengou and Nasushiobara city.
- Connecting path from adjacent Senbonmatsu Farm to Water Park. The path is made with dumped wood.

【History】

Open: April 14, 2010

【List of Cooperations and Permissions】

- the use of Aqueduct (Ministry of Agriculture, Forestry, and Fisheries)
- the use of sidewalk (Nasushiobara City)
- Water rights (Ministry of Land, Infrastructure, Transport and Tourism)
- the use of Land (Nasunogahara-tochi-kairyoku-rengou Tochigi Prefecture, Horai Inc.)
- Financial Aid(Ministry of Environmen)

Rumbling Water Turbine (Low Shot Water Turbine)



【Specifications】

- ◆Max. Output: 1.8kW ◆Effective Height head: 1.15m ◆Max. Water Discharge: 0.6m³/s
- ◆Water Wheel Dia.: 6m ◆Water Wheel Width: 70cm ◆Water Turbine Weight: 3,500kg ◆Total Weight: 6,250kg

【Low Shot Water Turbine】

- a manufacturer : nakagawa Inc.
- the date of manufacture : 2010
- a rotation : 9.77m⁻¹
- output : 1.91kW

【Acceleration Gear】

- a manufacturer : Winbell
- the date of manufacture : 2010
- rate : 1/8.7

【Permanent-Magnet Generator】

- a manufacturer : Winbell
- the date of manufacture : 2010
- a rotation : 85m⁻¹
- voltage : 200V
- current : 8.8A
- output : 3kW

- The frame of a water wheel is made of aluminum. Stainless steel is adopted in a vane part.
- Water flow works at lower part of a wheel, and the wheel rotates by water flow.
- Since the wheel rotates slowly, it is connected with a dynamo by way of acceleration gears.(8.7 times faster
- The generated electricity is converted from AC to DC to AC to control output kWh before sent to distribution

Cross-Flow Water Turbine (Rattling Water Turbine)



【Specifications】

- ◆Max. Output : 8kW×2 ◆Effective Height : 1.35m ◆Max. Water Discharge : 1.0m³/s×2
- ◆Bladed Wheel Dia. : 61cm ◆Total Weight : 3,200kg×2

【Cross-Flow Water Turbine】

- a manufacturer: nakagawa Inc.
- the date of manufacture: 2010
- a rotation: 69rpm
- output: 8.7kW
- a number of generator: 2

【Permanent-Magnet Generator】

- a manufacturer: Winbell
- the date of manufacture: 2010
- a rotation: 85rpm
- voltage: 200V
- current: 32.1A
- output: 10kW
- a number of generator: 2

- Two units are installed next to each other at the bump (drop) of 1.8 m in Nasu Aqueduct.
- The turbine is named after the fact that water flow crosses in the impeller.
- The generator is installed beside and connected directly to the impeller which is similar to a fan of an air-conditioner.
- The generated electricity is converted from AC to DC to AC to control output kWh before sent to distribution line.

Elephant-Nose Water Turbine (Siphon Propeller Water Turbine)



【Specifications】

◆Max.Output:2.2kW ◆Effective Height:0.5m◆Max.Water Discharge:1.0m³/s ◆Total Weight:3,300kg

【Vertical Shaft, Propeller Water-Turbine】

- a manufacturer : SHP Inc.
- the date of manufacture : 2010
- a rotation : 300rpm
- output : 2.97kW
- propeller water-turbine dia. : 58cm

【Permanent-Magnet Generator】

- a manufacturer:Winbell (Korea)
- the date of manufacture:2010
- a rotation:300m-1
- voltage:200V
- current:38.6A ▪ output:10kW

- Diversion equipment is installed in 1.8m drop in Nasu Aqueduct the water flow is drawn in the tank installed at the side of a waterway, and then water is returned to Aqueduct by "Siphon Principle". Propeller water turbine is installed in the waterway.
- Water Wheel powered by the dynamo used as a motor pumps up water at the time of start. Power generation is started when it comes to "Siphon Mode".
- The generated electricity is converted from AC to DC to AC to control output kWh before it is sent to distribution

Other Facilities

Connecting Path / Hybrid Lighting



- Solar Panel: 70W
- Wind Power: 20W
- Storage Battery built-in Hybrid Lightings 12V,50Ah
- Storage Battery for Lightings(Embedded in wooden sidewalk): 12V,130Ah
- No connection with power company

"Sosui-no-Akari"
(LED Lighting)



LED Lights installed on the fence
of a sidewalk (43W LED)

"Sennen-no-Mizu" (Meeting Place)



Water is pumped up from Nasu Aqueduct and the
Nasunogahara water flow is reproduced

"Park Panel Board"
(Electric Vehicle charging equipment)



Inside



Charge

20kW, Electric Vehicle recharge equipment.
Electricity generated by the water wheels
installed in Aqueduct are also used.

"Sosui Mamoru-kun"
(Trash Removal Facility)



Screen catches trash in Aqueduct

