

LOCAL ENERGY PRODUCTION FOR LOCAL CONSUMPTION IN MOUNTAINOUS AREAS

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Farmers putting their own Archimedes Screw



A lot of Archimedes screw are used in farm of TOYAMA in 1930's.

Farmers put their own Archimedes Screw in a irrigation canal to get power for farm works.

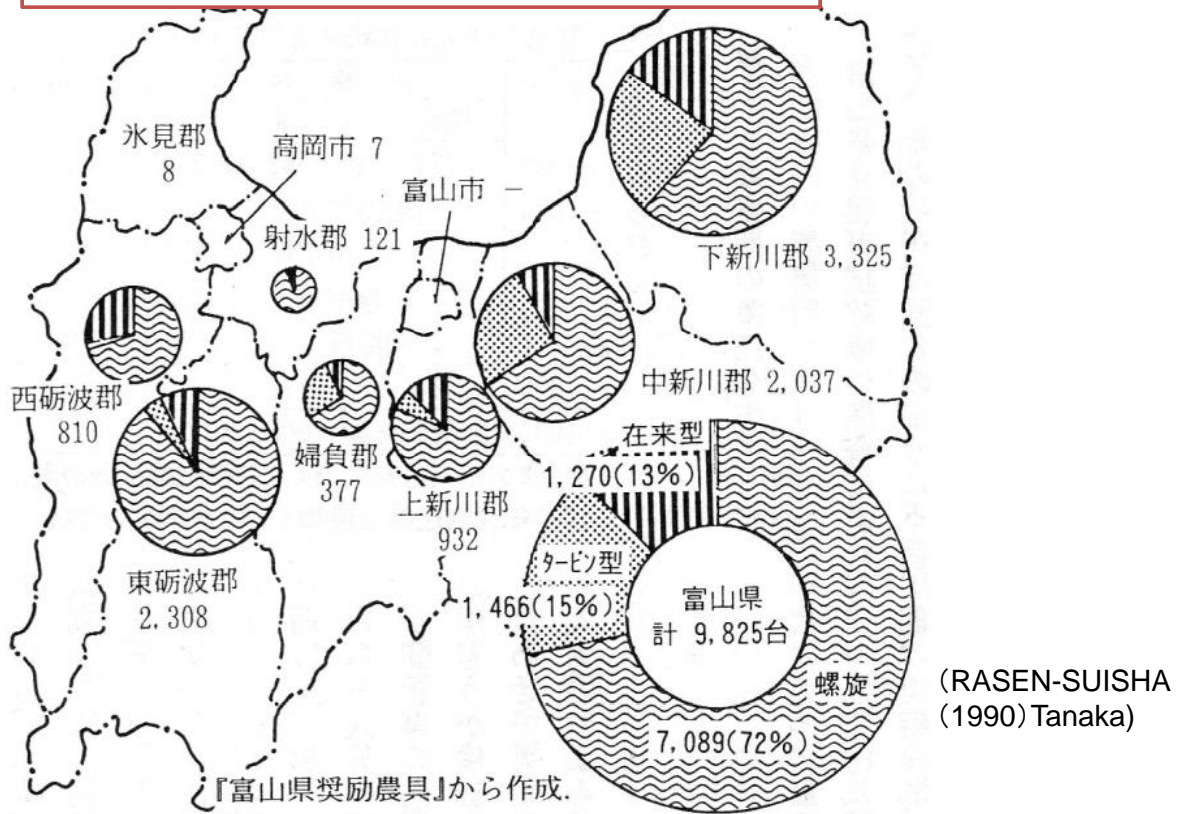
Two-wheeled cart by which the screw was carried can be seen in the back.

(RASEN-SUISHA (1990) Tanaka)

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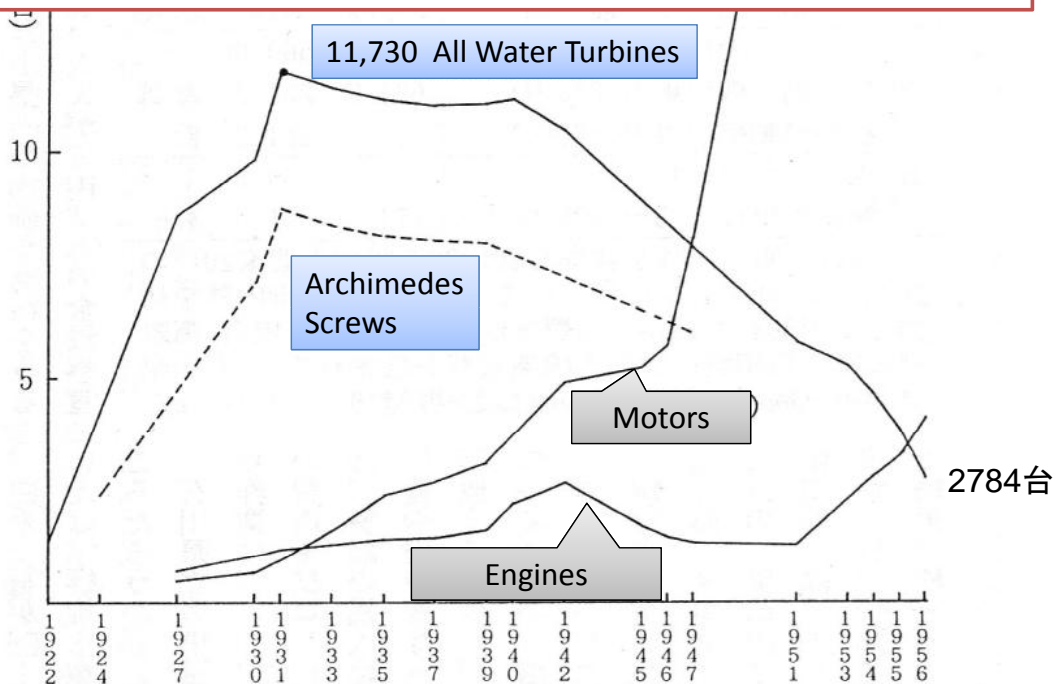
1930's, ca. 10000 water turbines worked in TOYAMA

Distribution in Numbers of Water Turbines (1930)



The Wheels were Replaced to Electric Motors

Change in Numbers of Archimedes Screws, Water Turbines and Motors



Water Turbines Move into Decline

- **Irrigation channel renovation**
 - Concrete-covered channel with increased flow and velocity
 - Hard to set the turbines
- **Farm electrification processed**
 - The electrical appliances : easy to use and control
 - High transmission efficiency of power
 - Downside of price in both electricity and motors
- **Performance of the water turbine face to the end**
 - Low torque and revolution: not sufficient to new farm machinery
 - Shorter life cycle

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Important Changes Associated with Turbine Decline

<Problems>

- Almost electricity users take power by money
- Farmers also don't know where the electricity originate from
 - Such a thing does not be cared.
 - Electricity supply is "affairs of other people"
 - The only thing which I can do is complaining.

The farmer who should be doing anything by himself became a "user" unawares!

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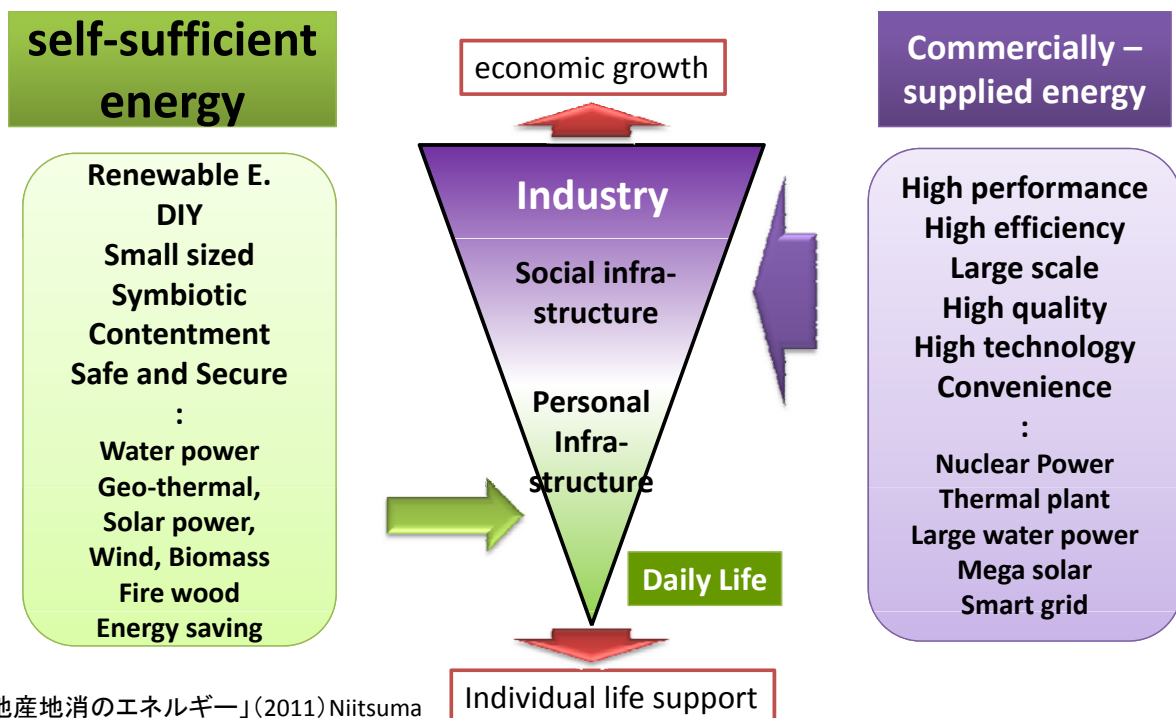
The 3rd Energy : Self-Sufficient Energy

1) Commercially - Supplied Energy	Commercial Products, Buying and Selling Value replaced with money Used by the general public Convenience ▪ Price ▪ Enterprise ▪ Profit ▪ Efficiency ▪ Competition ▪ law of dominance
2) Strategic Energy	National scale, Political measure Issue of urban side (This energy doesn't have substance)
3) Self-sufficient Energy	Daily essentials Gift of nature, Symbiosis with nature Pleasure of Production Value, cannot be measured with money

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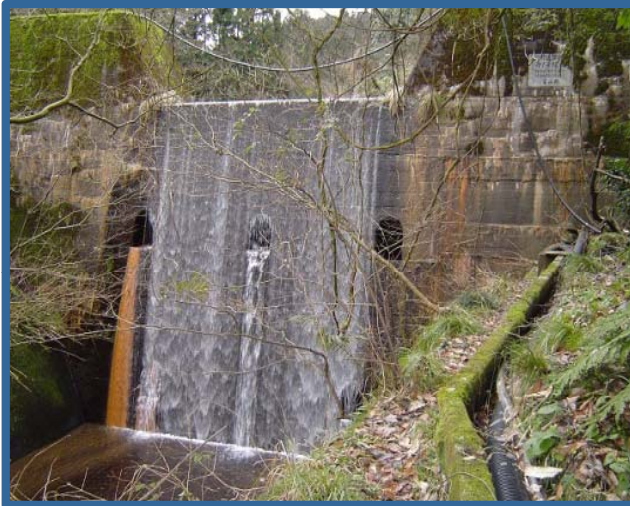
Energy Dual Path

This concept is to show the 2 paths in receiving energy, the second energy path being “self-sufficient energy.”



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Approaches Electricity Self-sufficient in a Farm Household



Water was conducted through a PVC pipe from an erosion control dam (Photo) in a mountain stream in Osawano area of Toyama city.

Flow rate of the stream : 30~50L/s

Point of Experiment

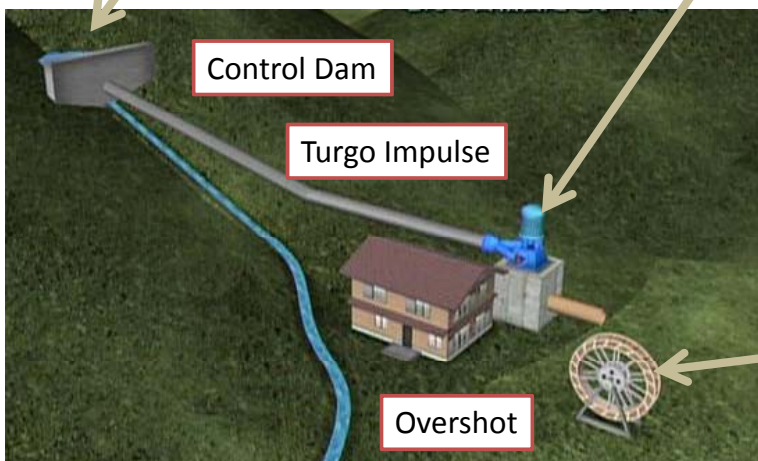
Arrangement of the System



Item	Spec.
Intake	Penetration
Dia.	200mm
Long	480m



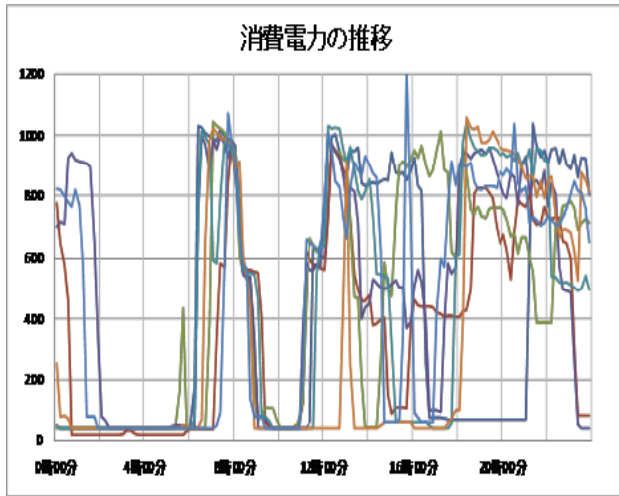
Item	Spec.
Type	Turgo-impulse
E. Head	11.5
Q(L/s)	20
P(kW)	1.0
Efficiency	50%



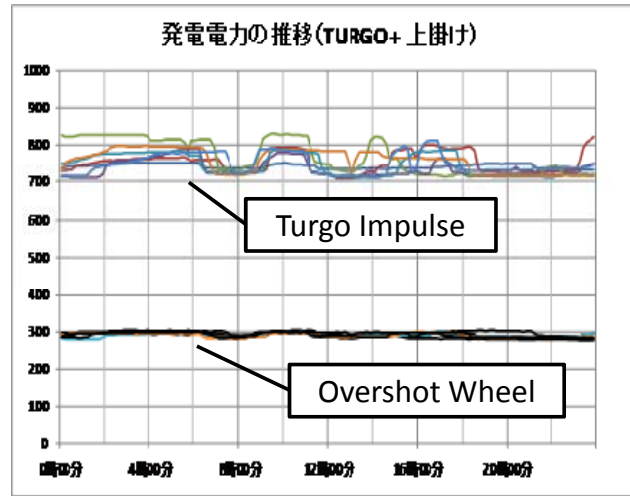
項目	緒元
type	Overshot
Q(L/s)	25
Dia. (m)	4
P(W)	400



Supply and demand Pattern in a Week

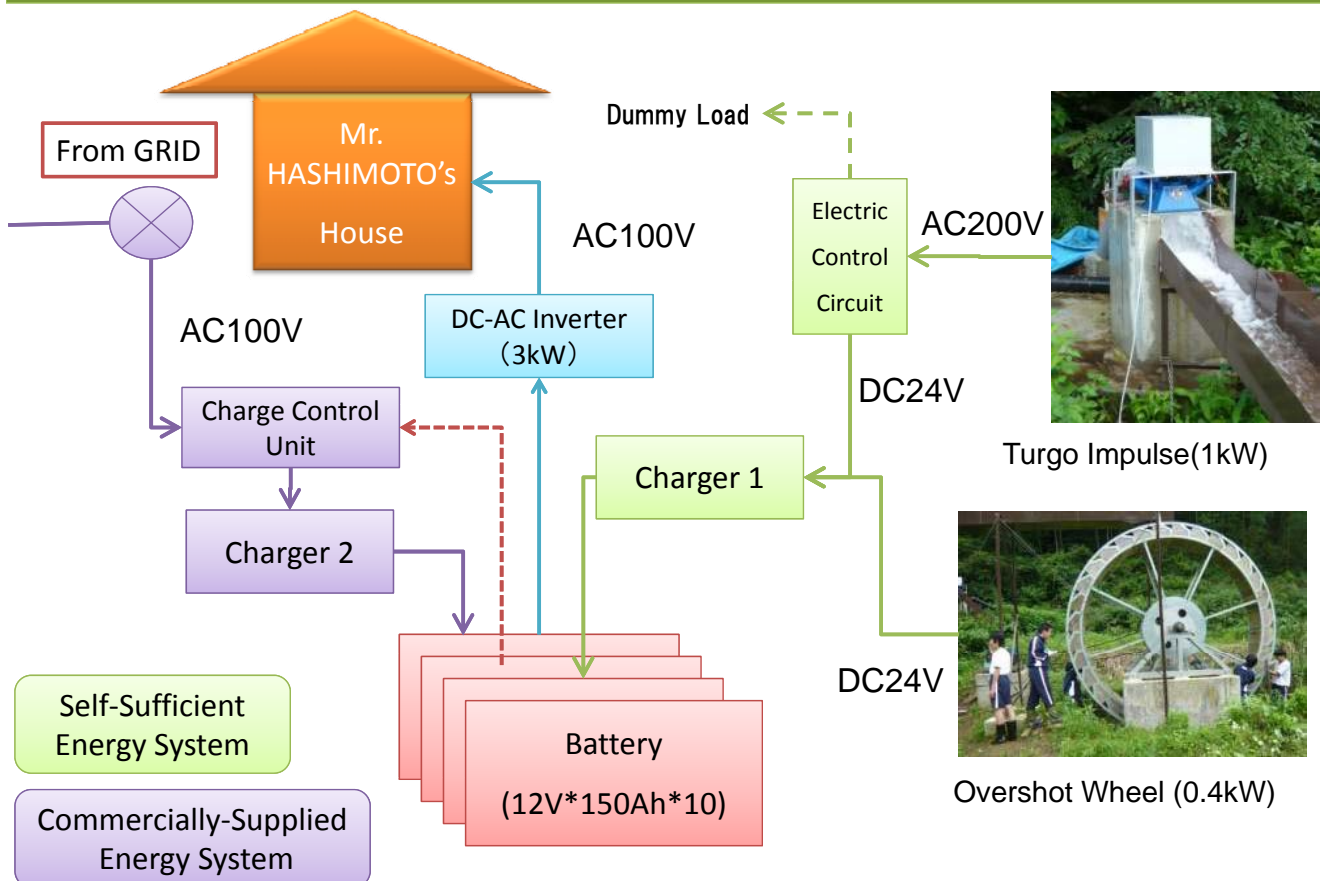


Electricity Demand Pattern in 7 Days



Electricity Supply Pattern in 7 days

Electric Control Diagram for Self-Sufficient



Some Changes are Occurred in Hashimoto-san

- **Mr. Hashimoto (the farmer) started to operate the generation system by water ON/OFF**
 - Mr. Hashimoto changeover the pressure pipe and water valve to be able to start/stop by himself.
 - He operates it depending on the flow rate of the water.
- **Mrs. Hashimoto became to ask electric things these days.**
 - How much the electricity charged in our battery?
 - How is the maximum output in our generation system?
- **The Electric Vehicle has been purchased by Mr. & Mrs. Hashimoto at last!**
 - They bought **Mini Cav-MiEV** of MITSUBISHI.
 - Planning to use it by **Micro-hydro Power**

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Energy Local Production for Local Consumption

- **Affluence and contentment are brought to the area by utilizing the resources of the area**
 - Scale of local production is always small, but **it is important for keep the security of individual life.**
 - Not only “local production and local consumption”
 - Commercial circulation is not denied
- **Safeguards system using Energy Dual Path concept**
 - **Providing safe and secure energy to a private life**
 - Self-sufficient energy path usually support daily life, and commercially-supplied energy acts as a safety-net of the energy
- **Supply by oneself, various benefits are enjoyable**
 - **Knowledge and techniques are accumulated** in the region and/or individuals
 - **Creation of new jobs** by which local resources and techniques are maintained
 - By using local natural energy, **values are circulated in the region.**
 - If you use fossil energy, huge amount of money is flow out to the other region.