

An aerial, wide-angle photograph of a massive concrete dam. The dam's spillways are visible, with water cascading down in multiple channels, creating a misty spray at the base. The dam stretches across the frame, curving slightly. The background shows a valley with some buildings and hills under a clear sky. The overall color palette is dominated by blues and greys, with the white foam of the water providing contrast.

The Power of Water

REESE HICKMAN, KARAH DONAHEY, & RYAN YASHER

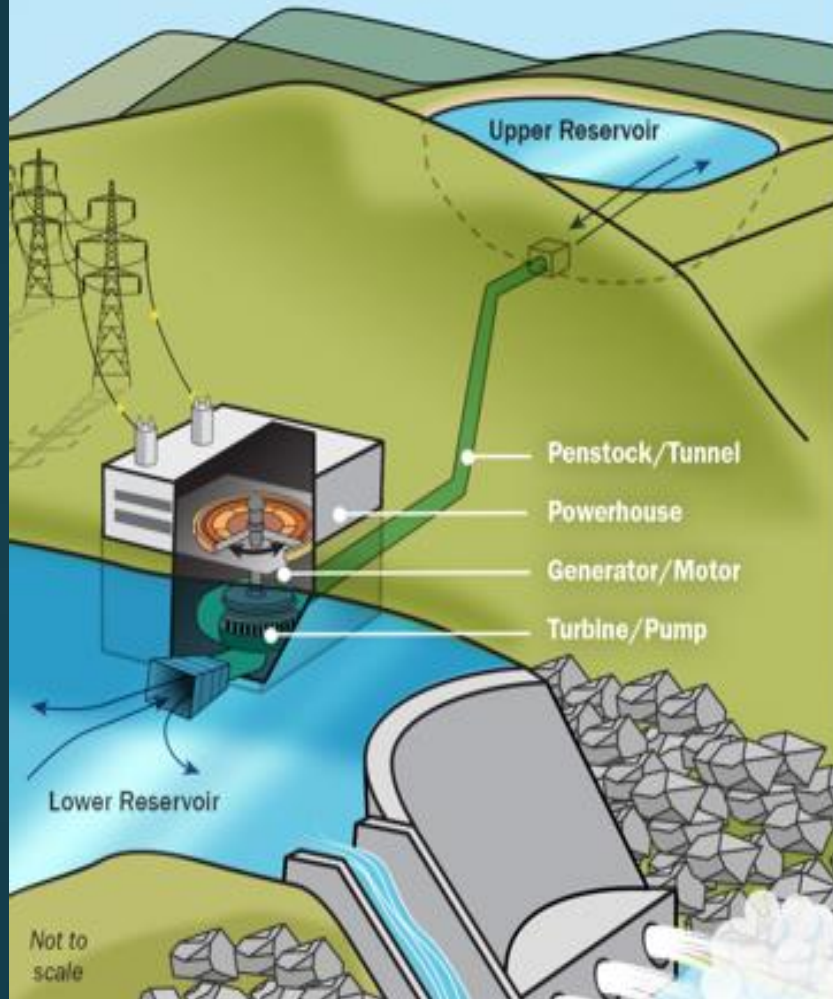
Introduction

A large wooden water wheel is the central focus, partially submerged in a stream. Water is splashing over the top of the wheel, creating white foam. The background shows a stone wall on the left and a blurred green landscape on the right. The scene is brightly lit, suggesting daylight.

- ▶ Hydroelectric power is harnessing the energy from water falling a great distance.
- ▶ Created in the mid 1700's
- ▶ 2744 dams producing waterpower, out of the United States 91,457 dams.

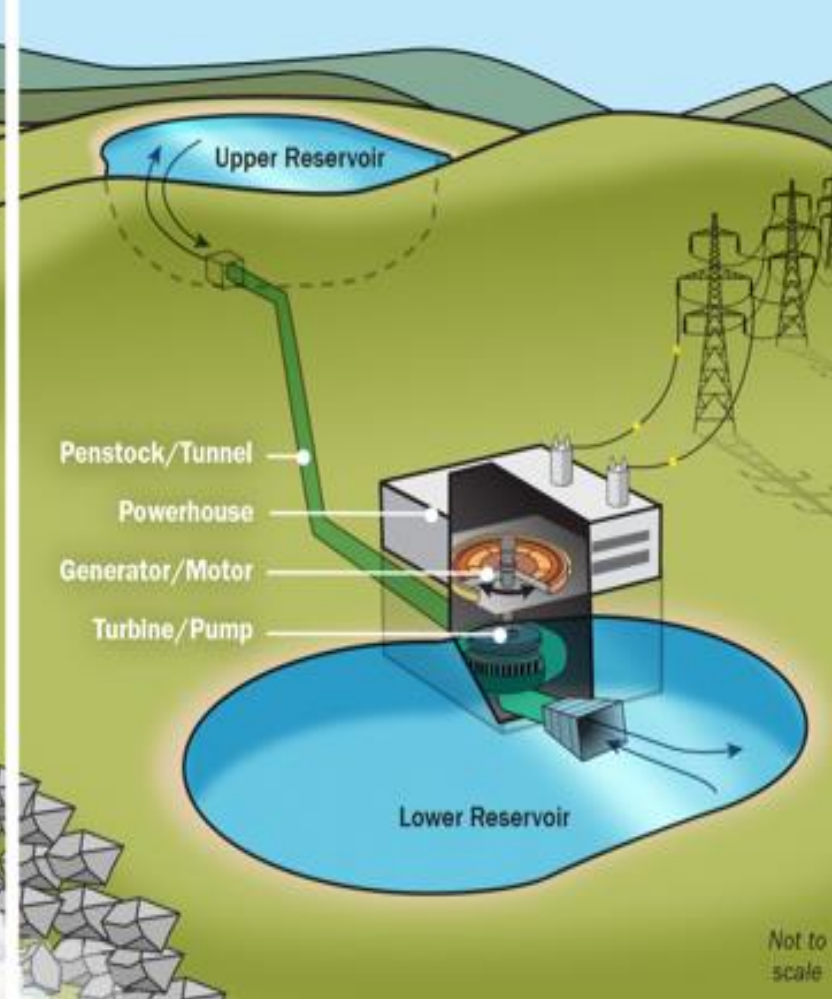
OPEN-LOOP PUMPED-STORAGE HYDROPOWER

Projects that are continuously connected to a naturally flowing water feature

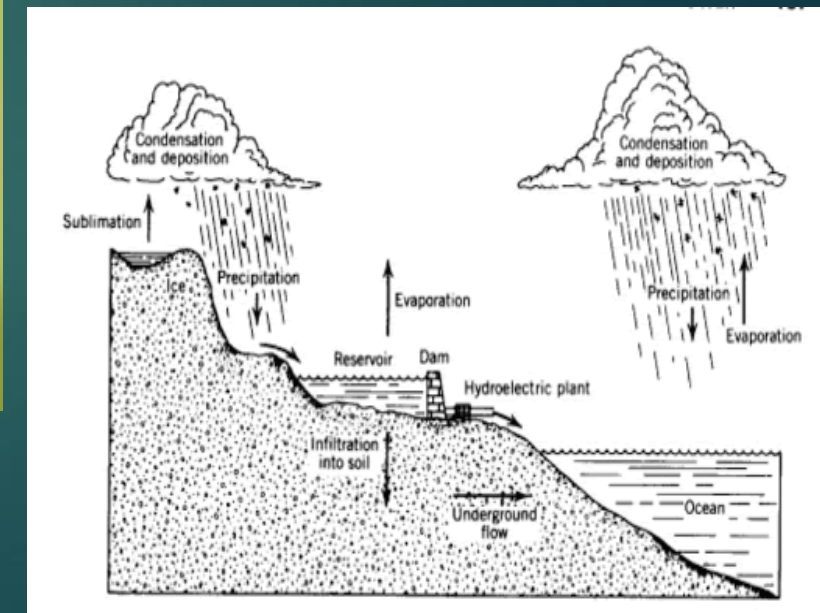


CLOSED-LOOP PUMPED-STORAGE HYDROPOWER

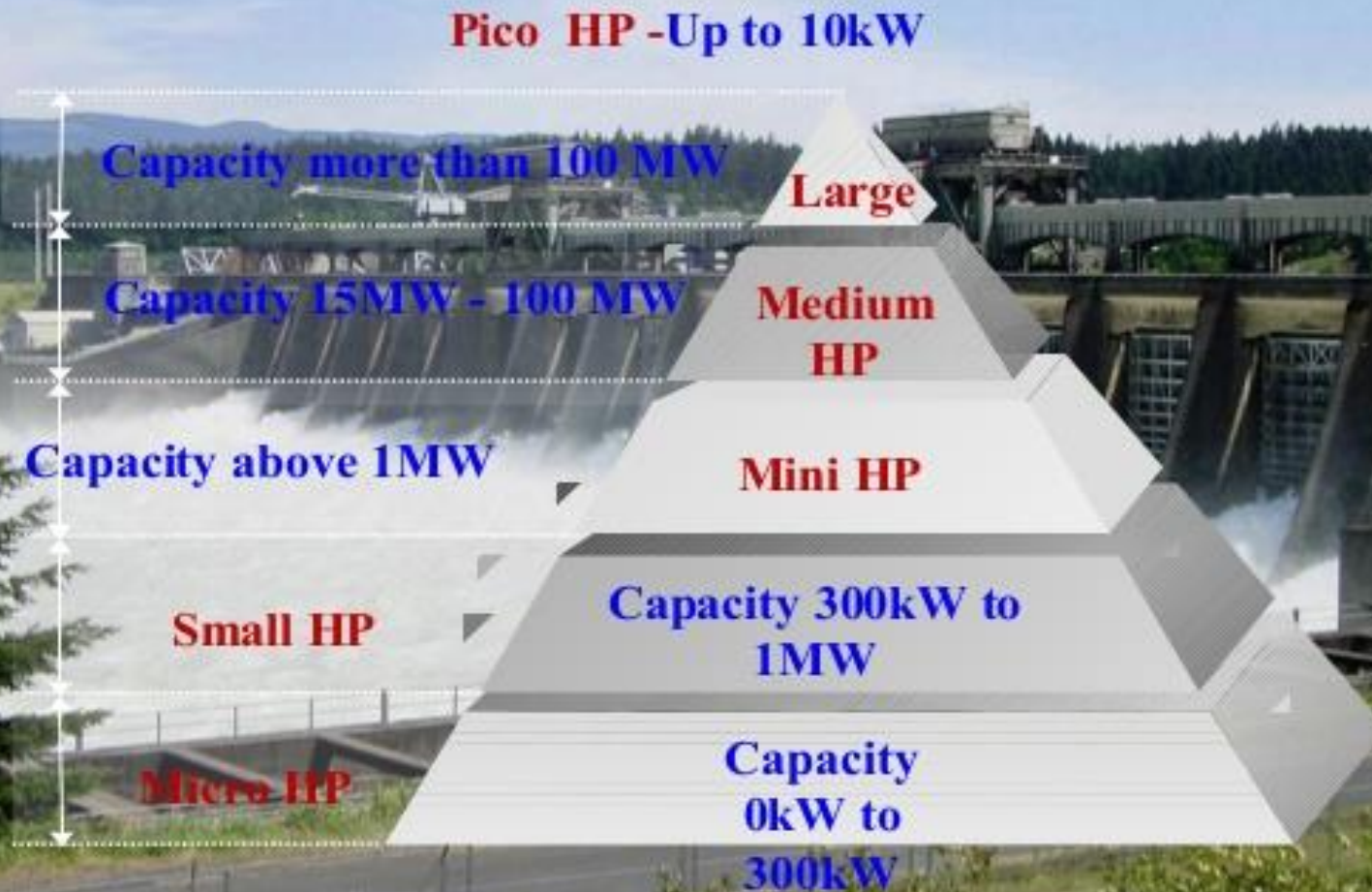
Projects that are not continuously connected to a naturally flowing water feature



- ▶ Impoundment Dam
- ▶ Bypass
- ▶ Pumped Storage

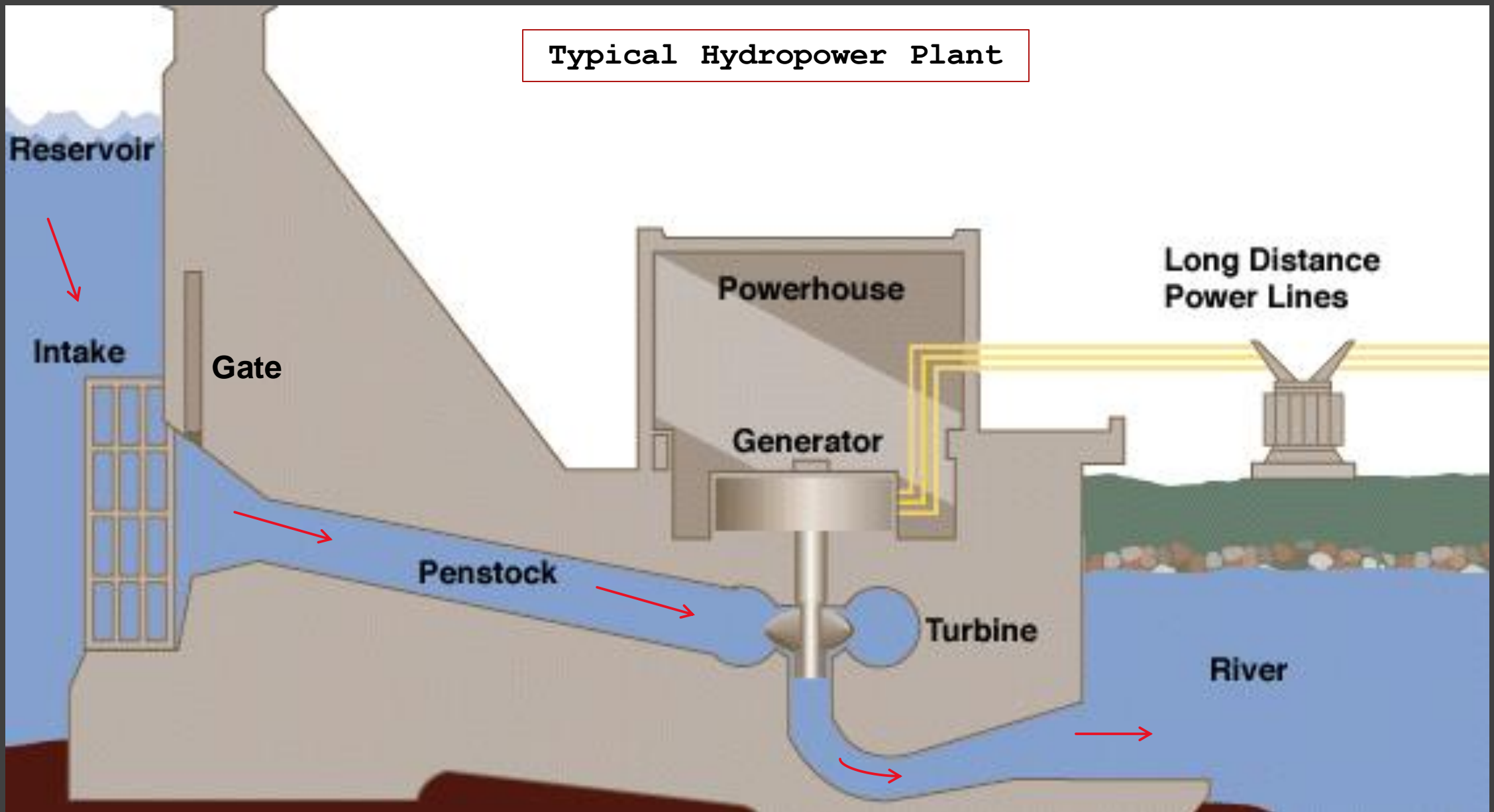


SIZES OF HYDROPOWER PLANTS

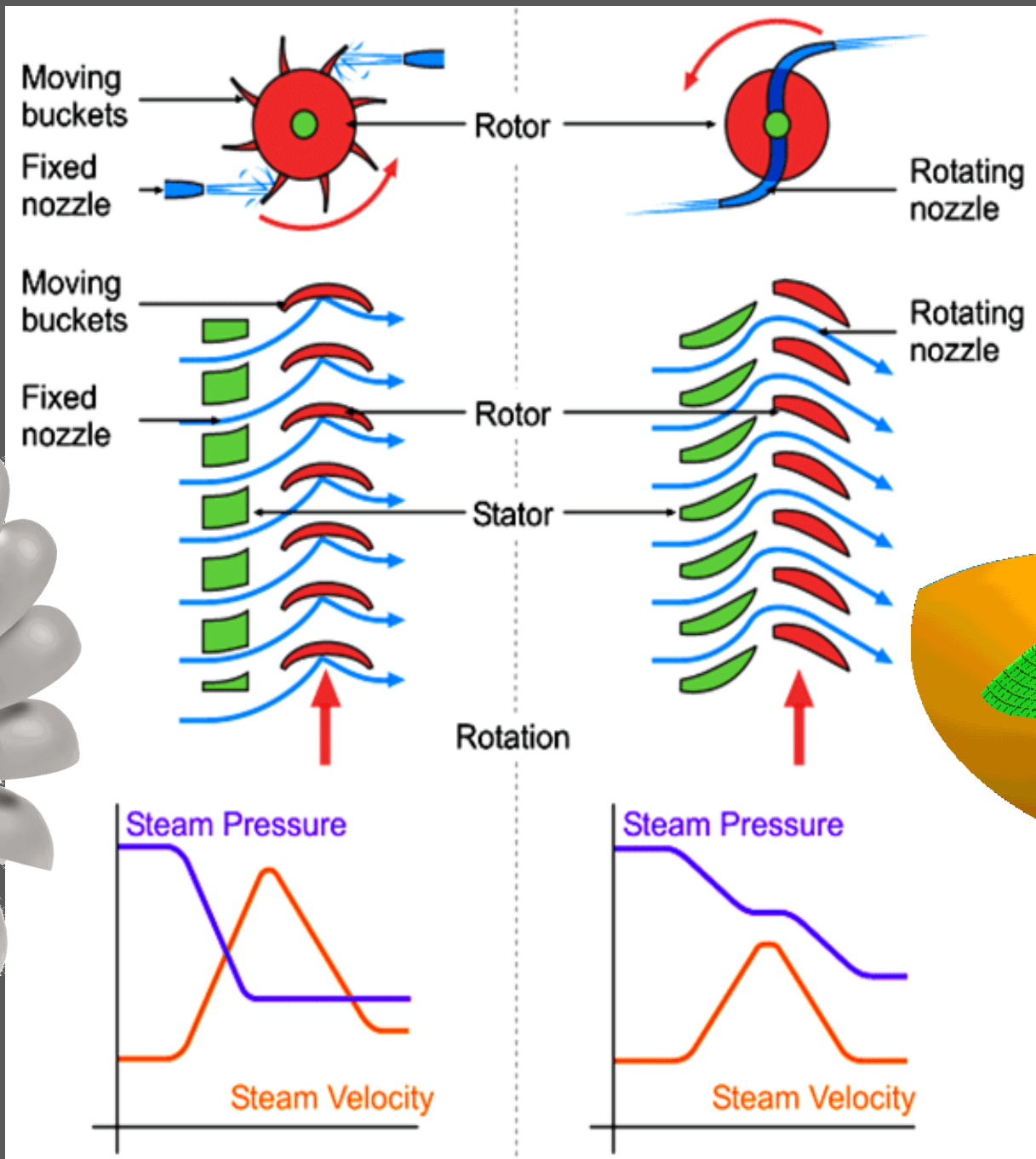
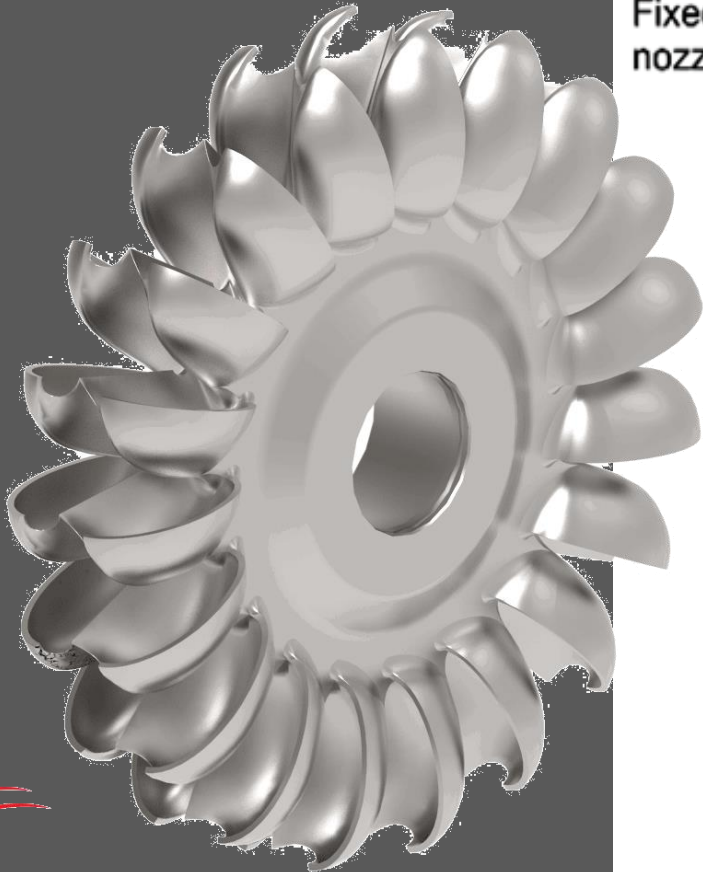


- ▶ The most common Hydropower station size is large.
- ▶ Created around the land

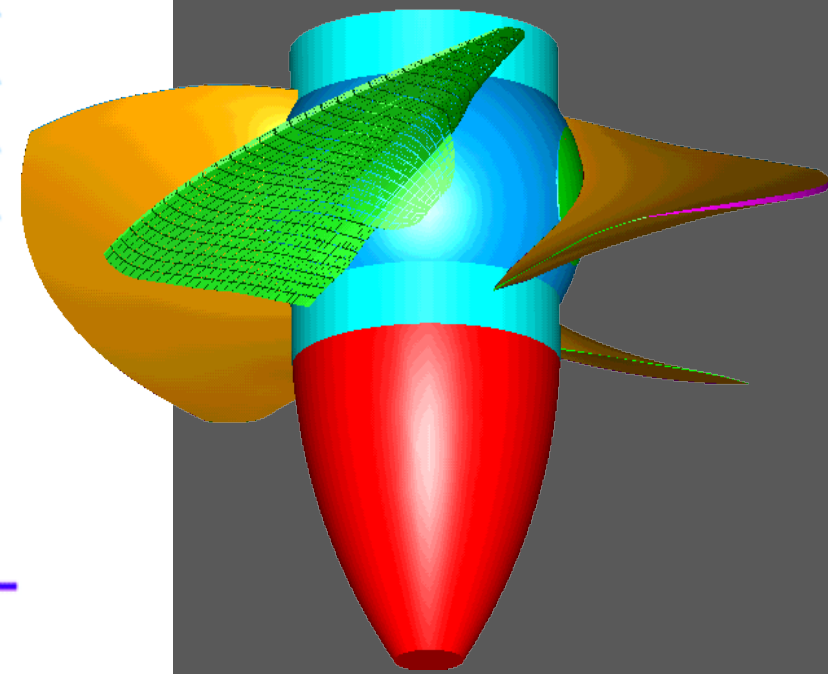
Typical Hydropower Plant



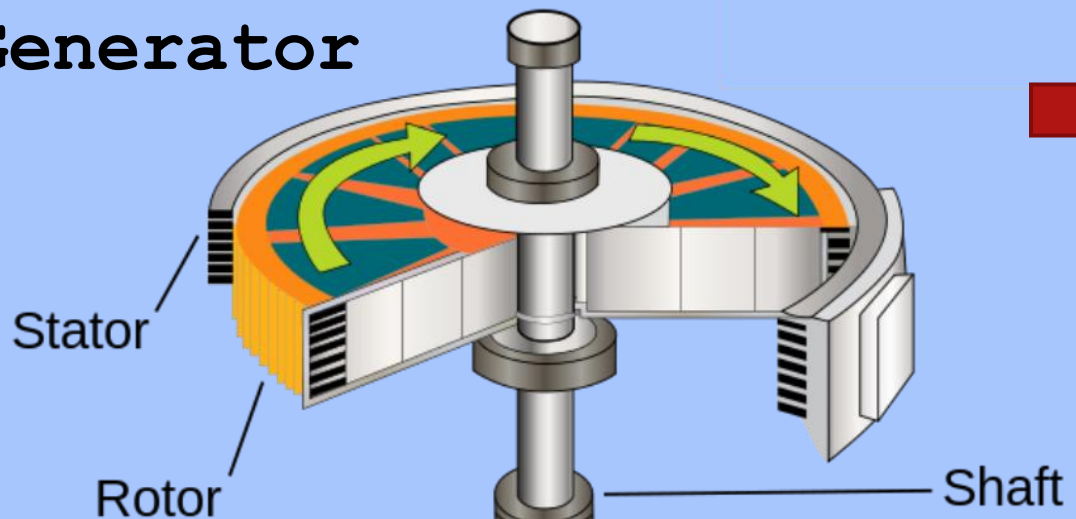
Impulse Turbine



Reaction Turbine



Generator

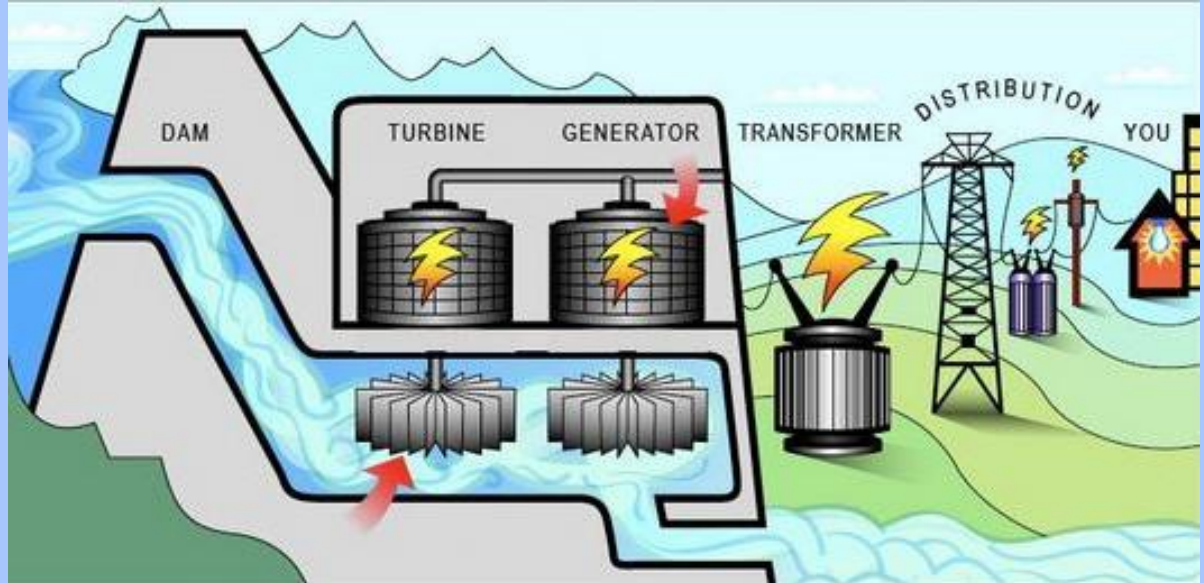
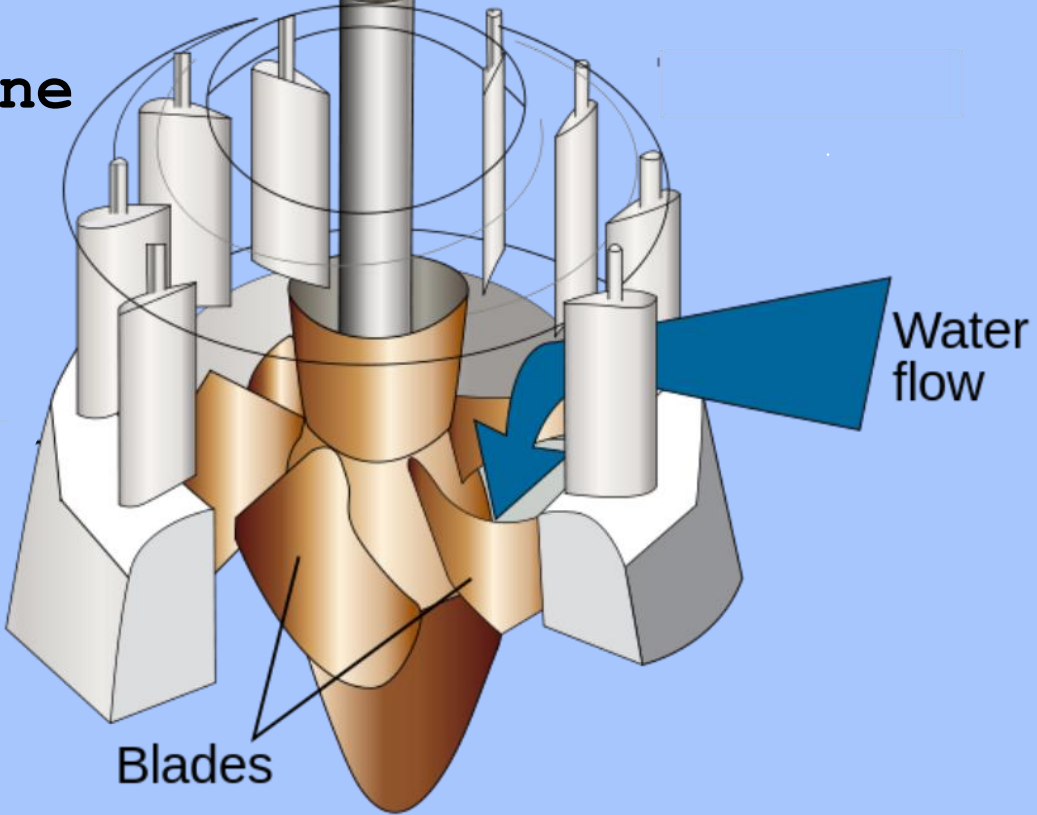


Hydraulic energy

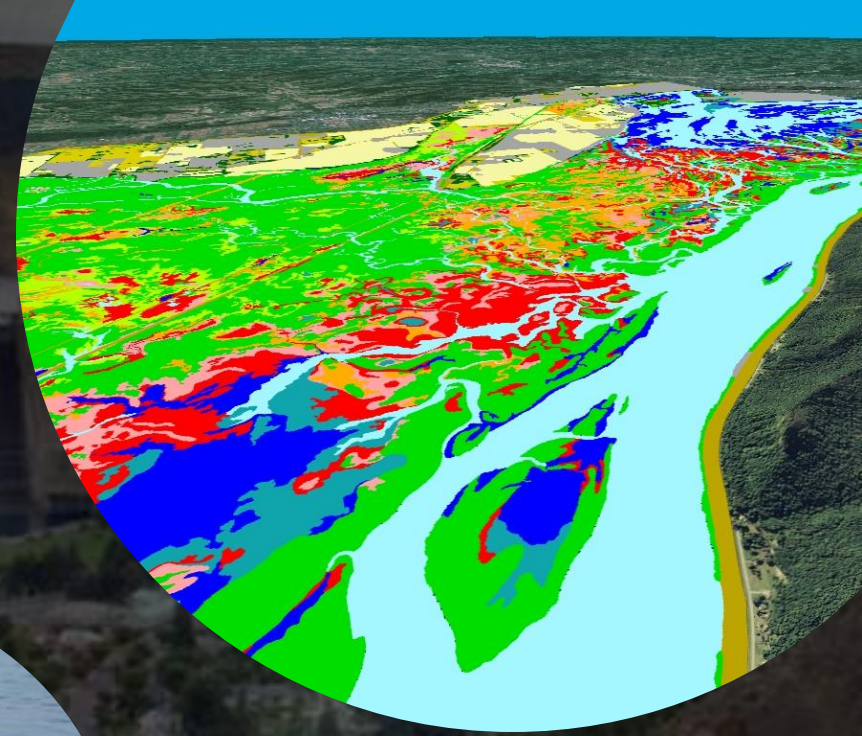
Mechanical energy

Electrical energy!

Turbine



The power of the falling water is directly proportional to the distance it falls and the river flow size.

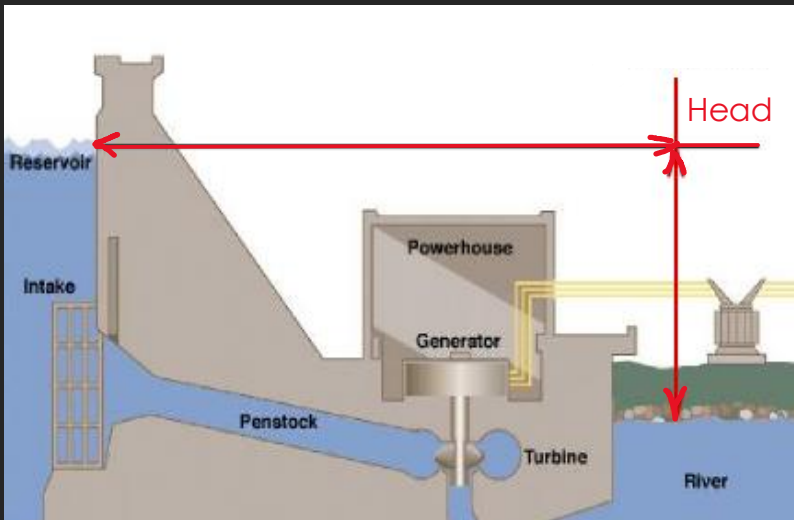


Gross Theoretical Capacity

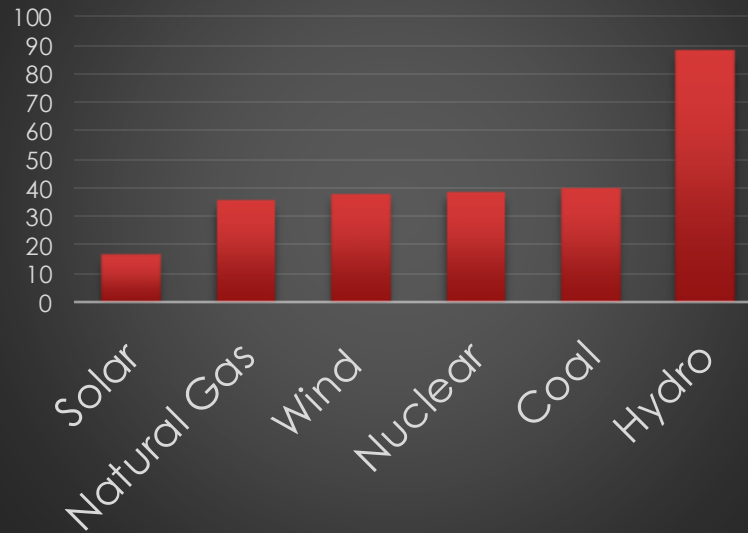


$$P(kW) = \left[eH(ft)Q \left(\frac{ft^3}{s} \right) \right] / 11.82$$

Hydraulic head



Efficiency

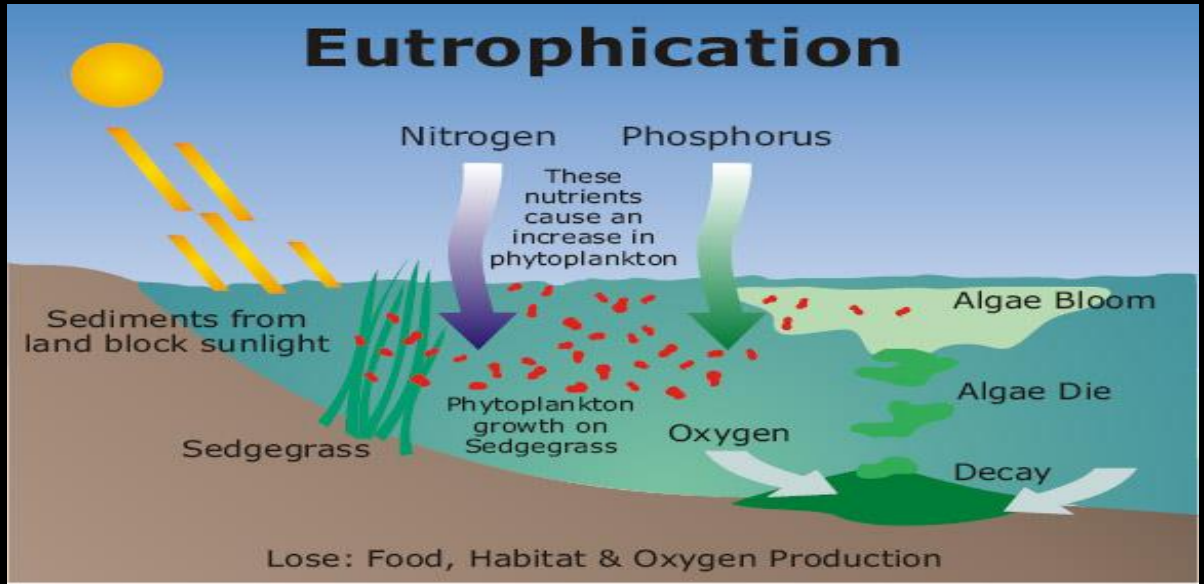


Stream gauging





Environmental Challenges



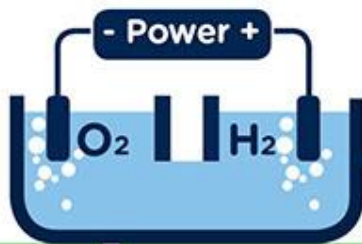
A world-first for green hydrogen

Offshore wind

Green electricity produces hydrogen

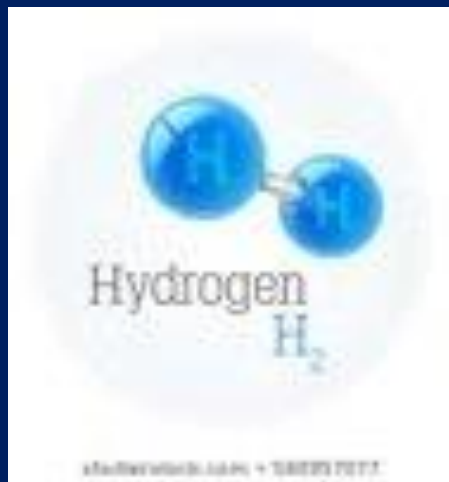
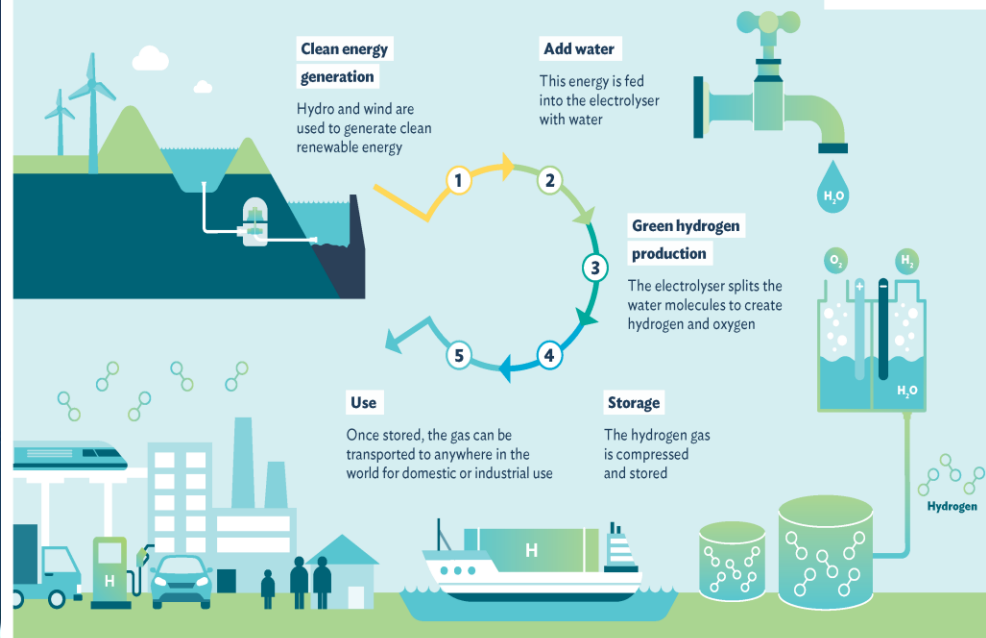
Safely stored

Zero carbon heating for homes



Transported through network

How is green hydrogen produced?

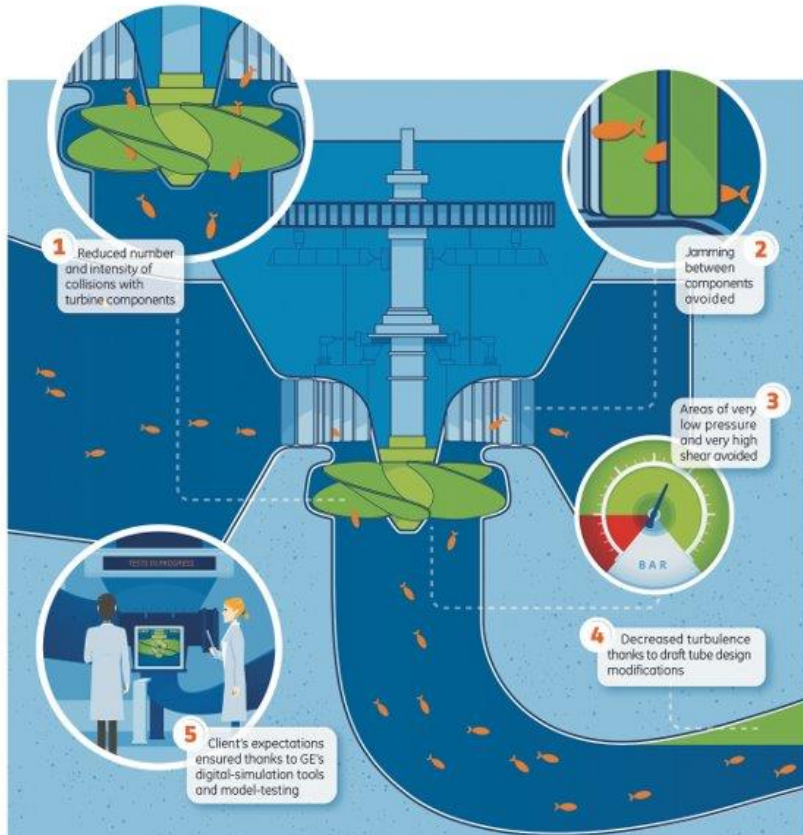


Research and Development



Fish friendly turbine

Whether fitting new turbines, or retrofitting existing equipment, GE Renewable Energy offers innovative and integrated solutions, so that migrating fish are preserved and, when necessary, levels of dissolved oxygen are increased.



- Integrated approach
- Enhanced energy efficiency
- Significant increase in the survival rate of fish





Converting to Hydroelectric

Repairing Dams





The Summary of Power and Water



Thank You For
Listening To Our Dam
Presentation!