

Cours CIVIL 469

Synthesis of the course, week #02 (26.02.2025), 4 hours (2h theoretical +2h exercises)

1. Hydropower definitions

- i. Flow Duration curve
- ii. Installed capacity (power in MW)
- iii. Energy yield (in kWh)
- iv. Mean annual runoff (MAR, in hm³)
- v. Modulus or Q_{mean}
- vi. HPP design flow $Q\%$ (débit d'équipement de la centrale)
- vii. Floods & Spillage
- viii. Ecoflows
- ix. Water use (in hm³)
- b. Selecting optimal $Q\%$
 - i. Operating at full capacity
 - ii. Operating at partial load
 - iii. Economic value per kWh

2. Hydropower in Switzerland

- a. Historical hydropower development in Switzerland
- b. Energy transition, targets for 2050
- c. Potential in the Alps, brownfield vs. greenfield projects
- d. Example of innovative brownfield project: Hagneck (renewal, increase in capacity, increase in yield, mitigation of nuisances)
- e. [Installations de production d'électricité en Suisse](#)
- f. [Les principales centrales hydrauliques de Suisse](#)
- g. Legal instruments => see [Force hydraulique](#)

3. Small hydropower

- a. Power < 10 MW or eventually < 50 MW
- b. Low head, low-medium discharge (few hundred L/s to dozen m³/s)
- c. High head, low discharge (few hundred L/s to x'000 L/s)
- d. Often no-regulation: Live storage volume / MAR < 2%
- e. Developed and remaining small hydropower potential for different World regions

4. Exercise 1

- Low-head hydropower plant (« follower » / no storage)
- High-head pumping scheme
 - LCOE
 - Annuity