Potential of pumped storage hydropower at La Gileppe dam

Based on M. FONDER Master Thesis

Speaker: S. ERPICUM

HECE – Hydraulics in Environmental and Civil Engineering
University of Liege

LIÈGE université

FACULTÉ DES SCIENCES APPLIQUÉES
UEE
Urban and Environmental Engineering

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Context

- **Transition to renewable energy → Need for more electricity storage**

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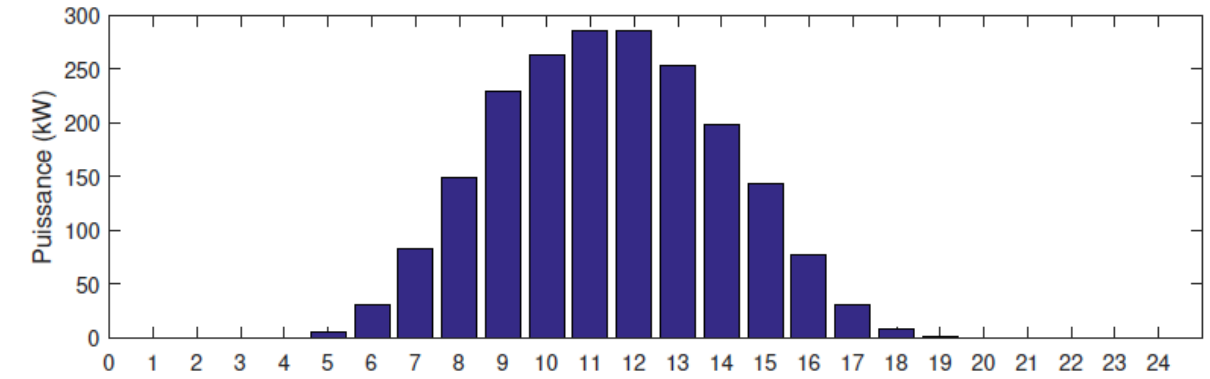
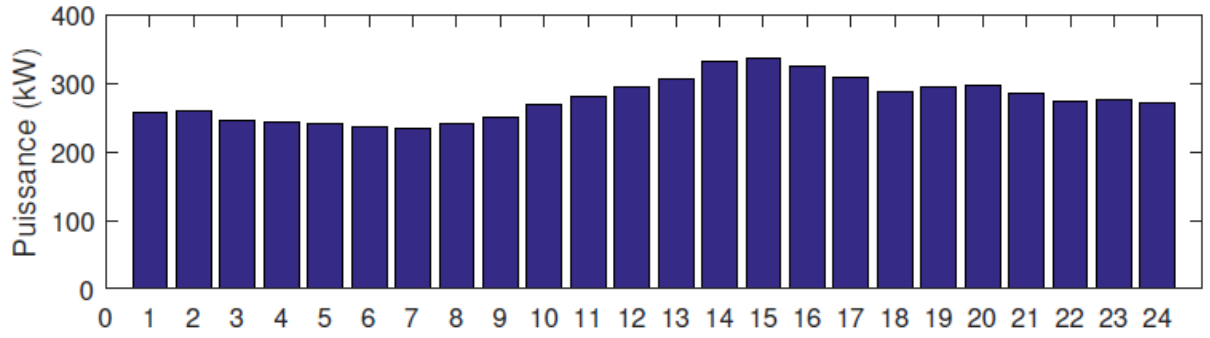
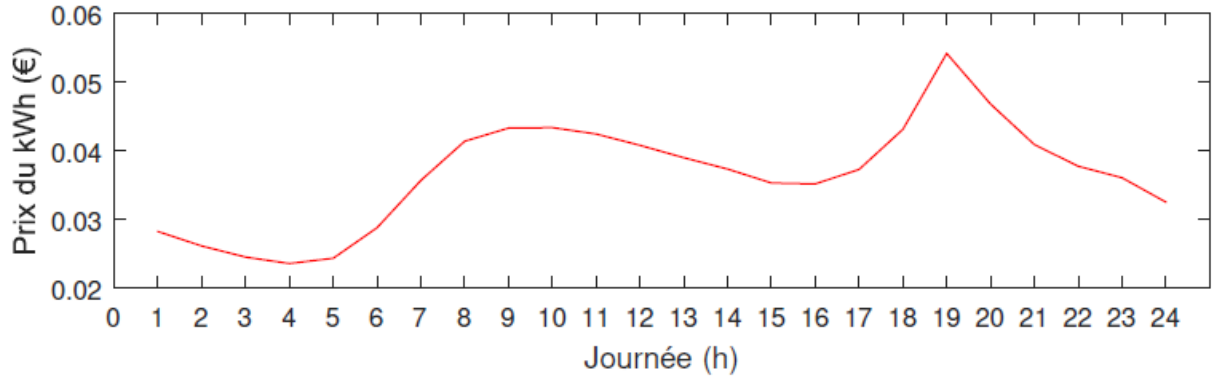


PV production



Wind turbine production



Electricity price → ≈ demand

Context

- **Transition to renewable energy → Need for more electricity storage**
- **Pumped storage is an effective and sustainable way to store electricty**

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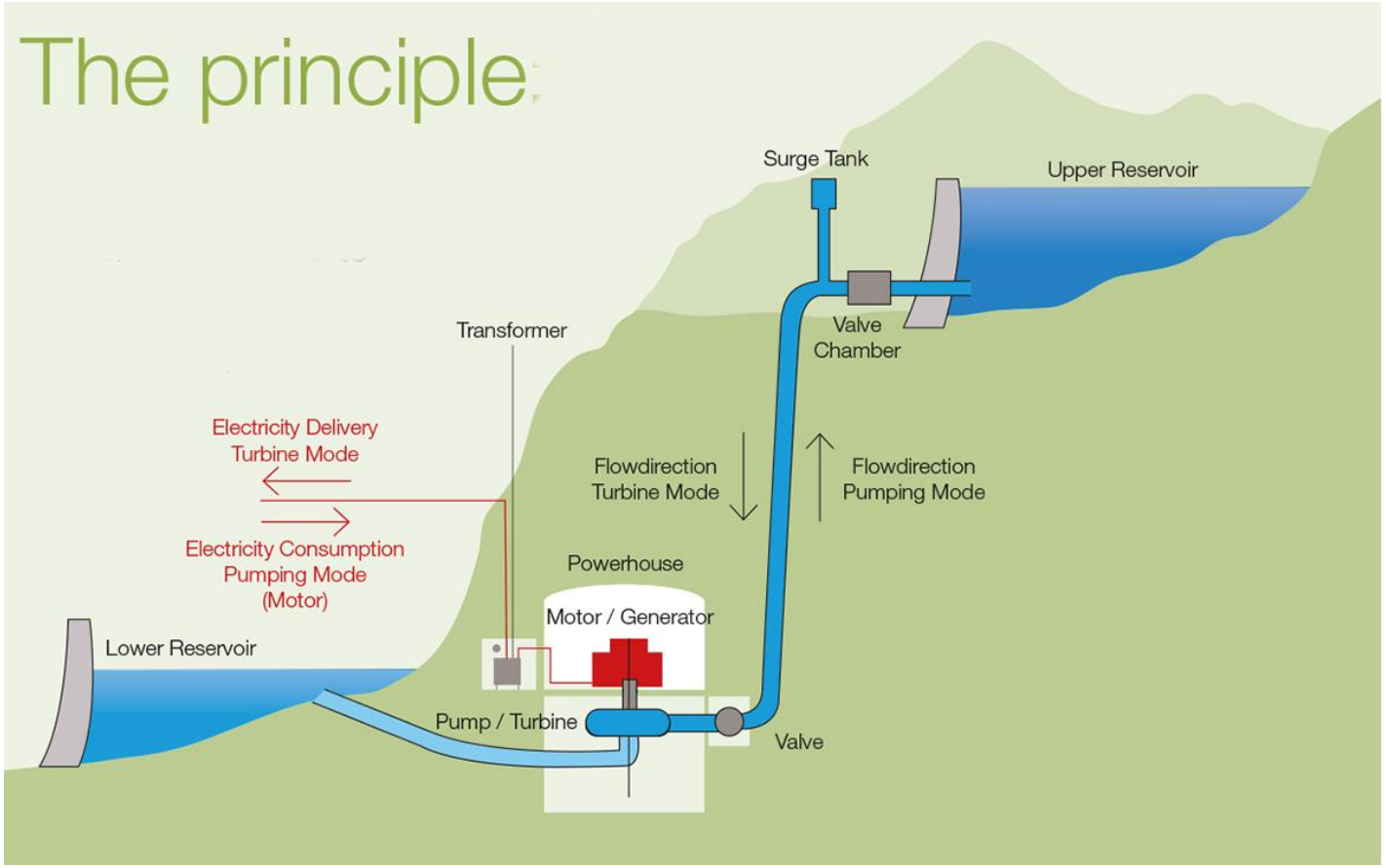
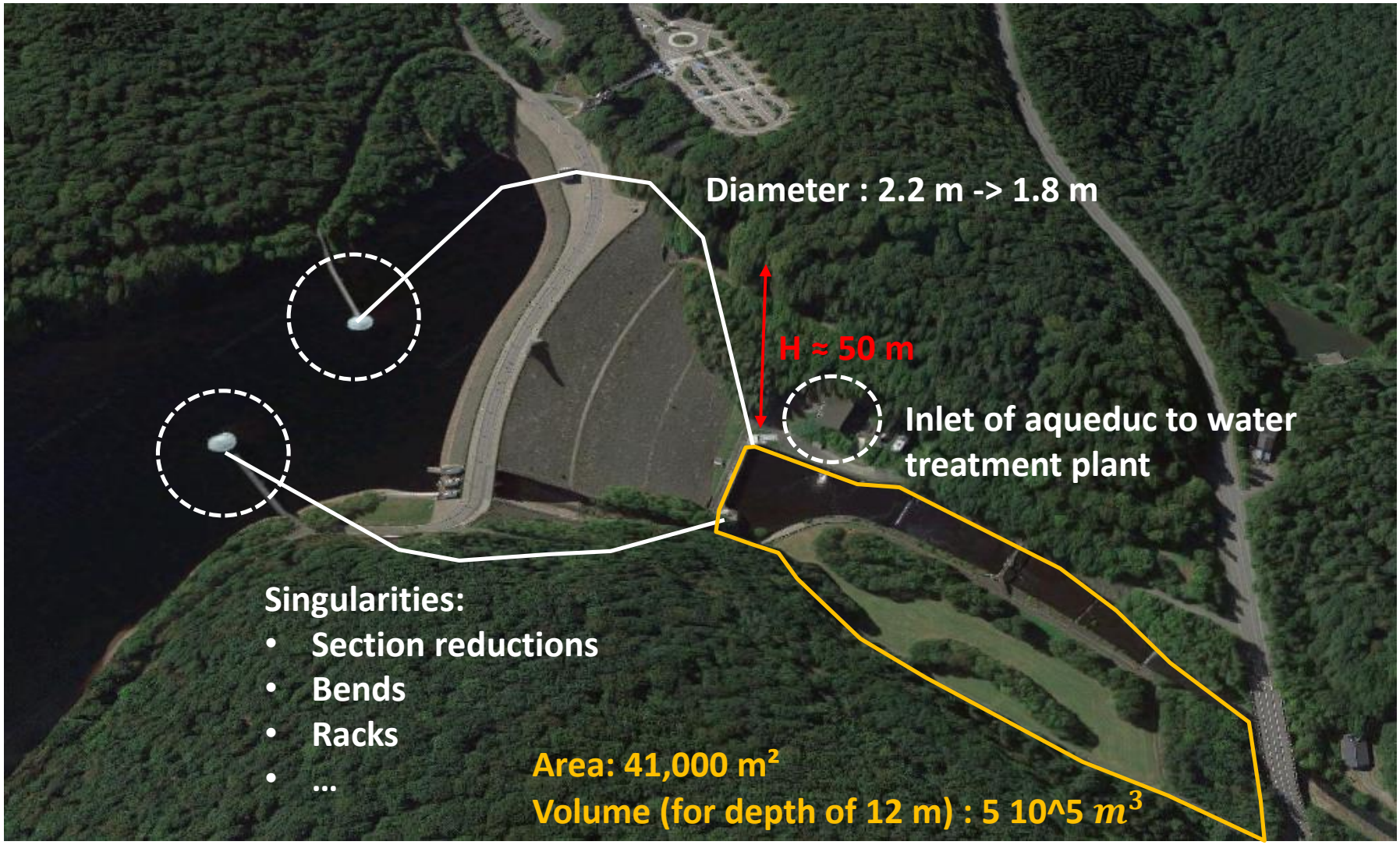


Source : Andritz.com

La Gileppe dam



Source : Google map

Different scenarios

Different scenarios

System: Use of existing infrastructure

Economy: Difference in electricity price during the day

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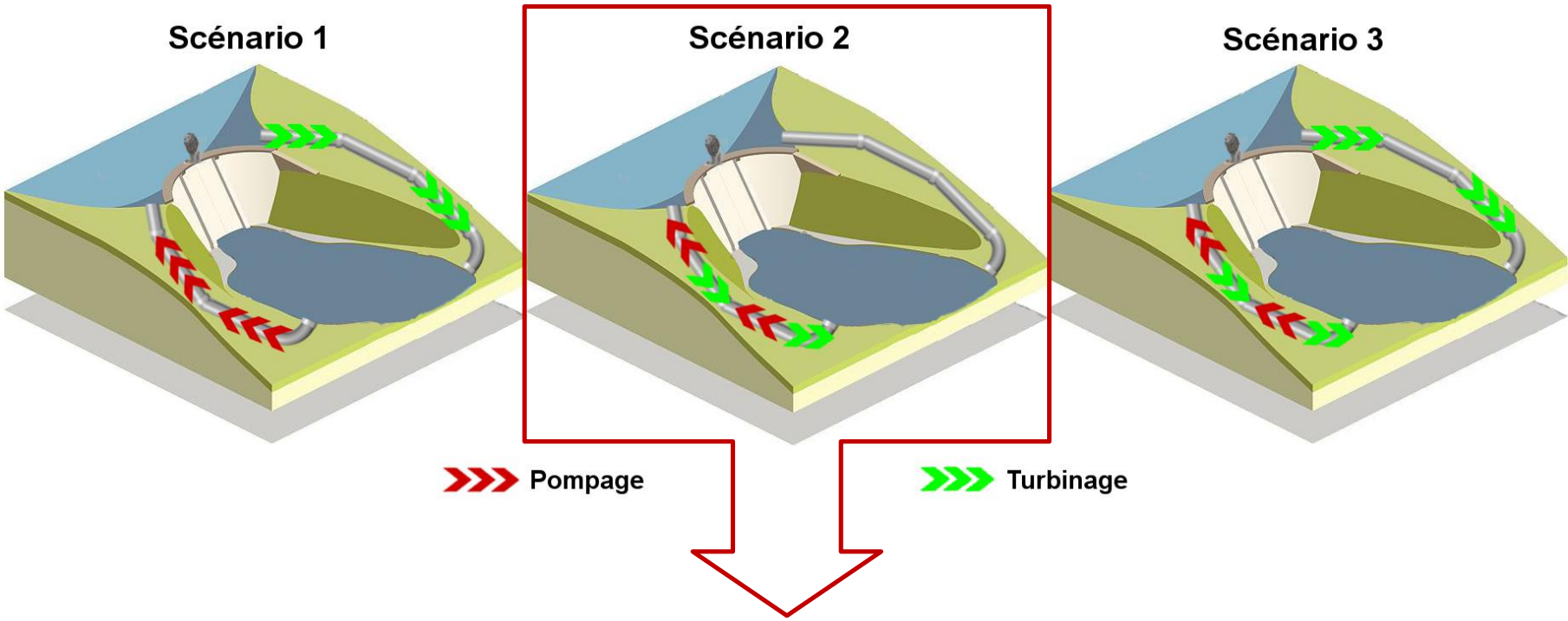
Economy: Difference in electricity price during the day



Efficiency: 68 %

Mean power in turbine mode: 4 MW

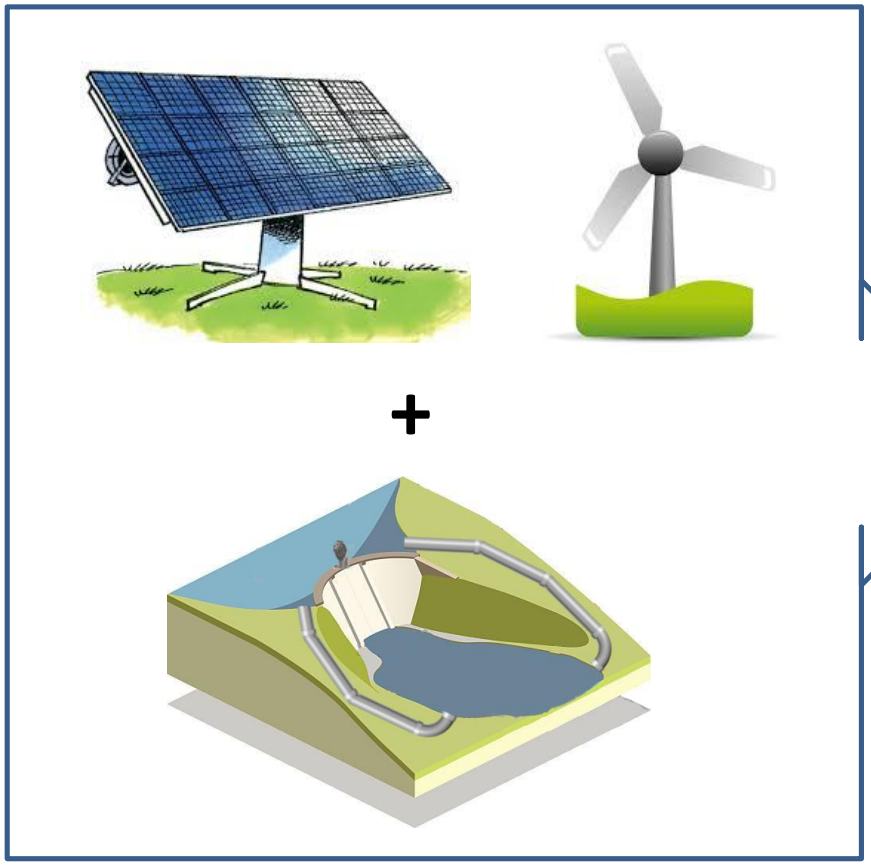
Cost: 3.5 M€ (214 €/kWh)

Income: 100 000 €/y ≈ fees for transport grid…

Different scenarios

System: Use of existing infrastructure **+ PV or wind turbines**

Economy : Difference in electricity price during the day **+ shift of PV/wind turbines production**



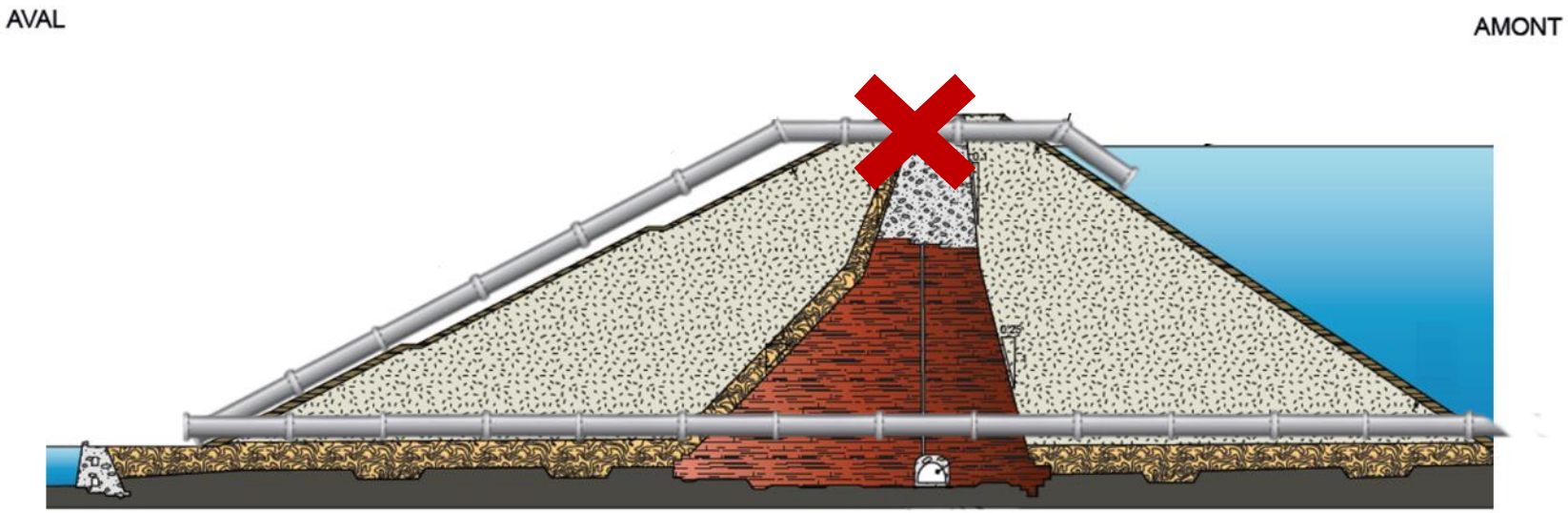
Less interesting than direct injection on the grid because of

- PSP efficiency (≈ 70%)
- Too small difference in electricity price

Different scenarios

System: New penstock ϕ=4.5m→ **more power and flexibility**

Economy : Difference in electricity price during the day



Estimated income: 0.8 M€/y (including 0.6 M€/y for transport grid)

BUT very costly new civil works

Different scenarios

System: Use of existing infrastructure + PV and wind turbines

Economy : **Micro-grid, paid directly by consumers**

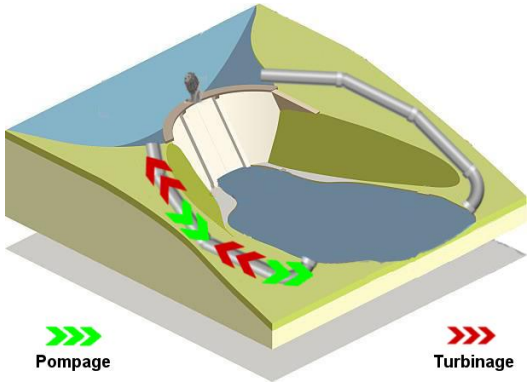
Different scenarios

System: Use of existing infrastructure + PV and wind turbines

Economy : **Micro-grid, paid directly by consumers**

55,000 m²

5 wind turbines of 1MW



4 MW in turbine mode
6 MW in pumping mode
Downstream basin
500,000 m³
Capacity 115 MWh

4,000 houses
(Jalhay city, 3.3 km closeby, is 3,500 houses)

→ Cost less than 500 €/y/house on a 30 years period

Independant micro-grid

Thank you for your attention

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