

OPTIMAL DESIGN AND MANAGEMENT OF THERMAL STORAGE TANKS FOR MULTI-ENERGY DISTRICT BOILERS

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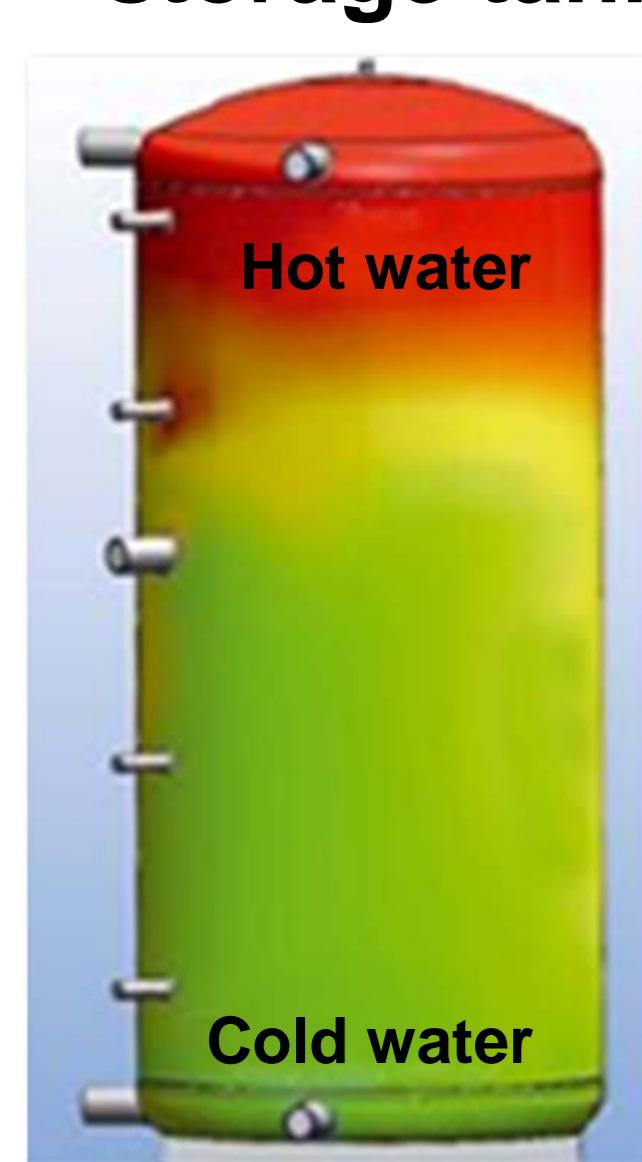
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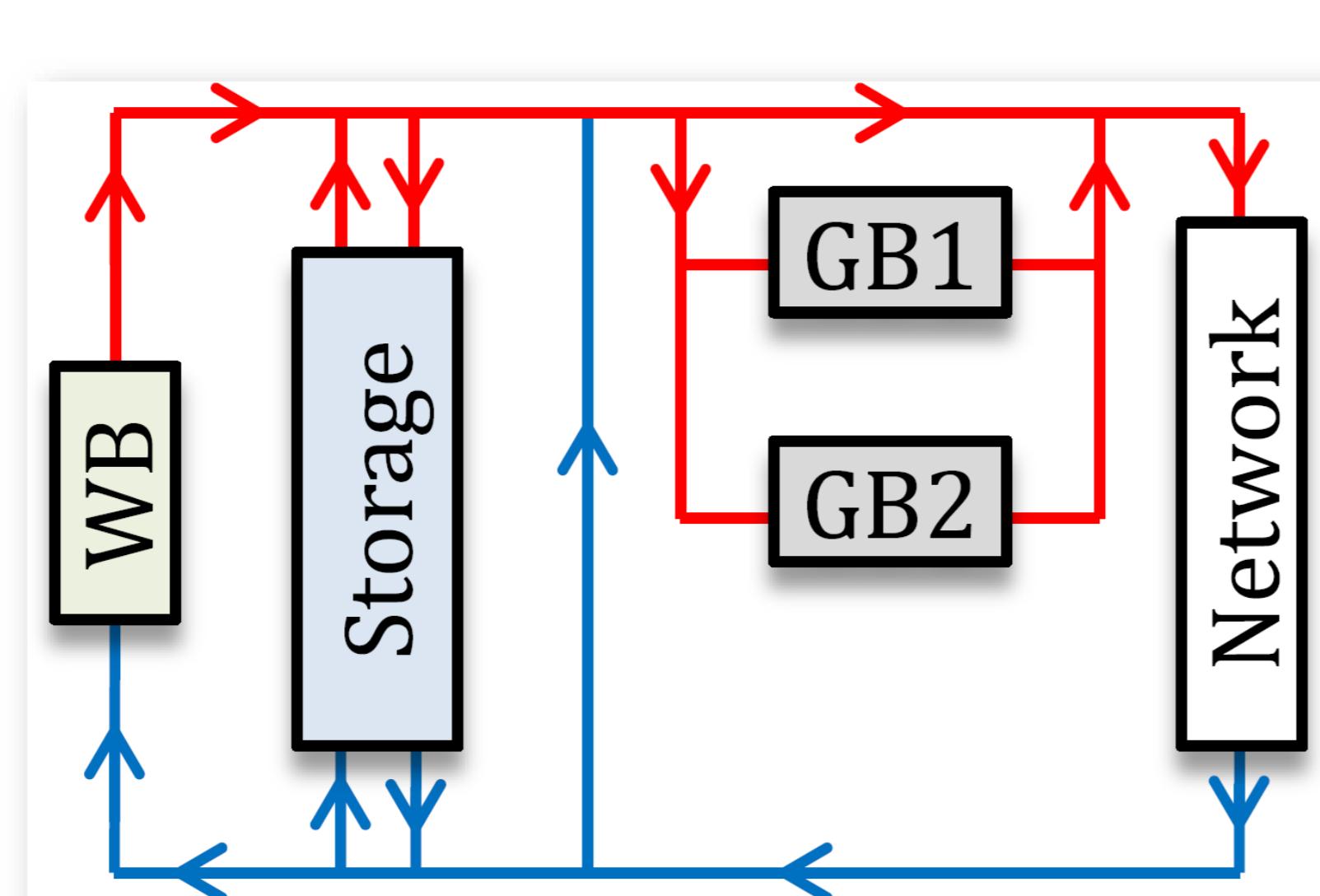
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MANAGEMENT STRATEGY

Stratified water thermal storage tank

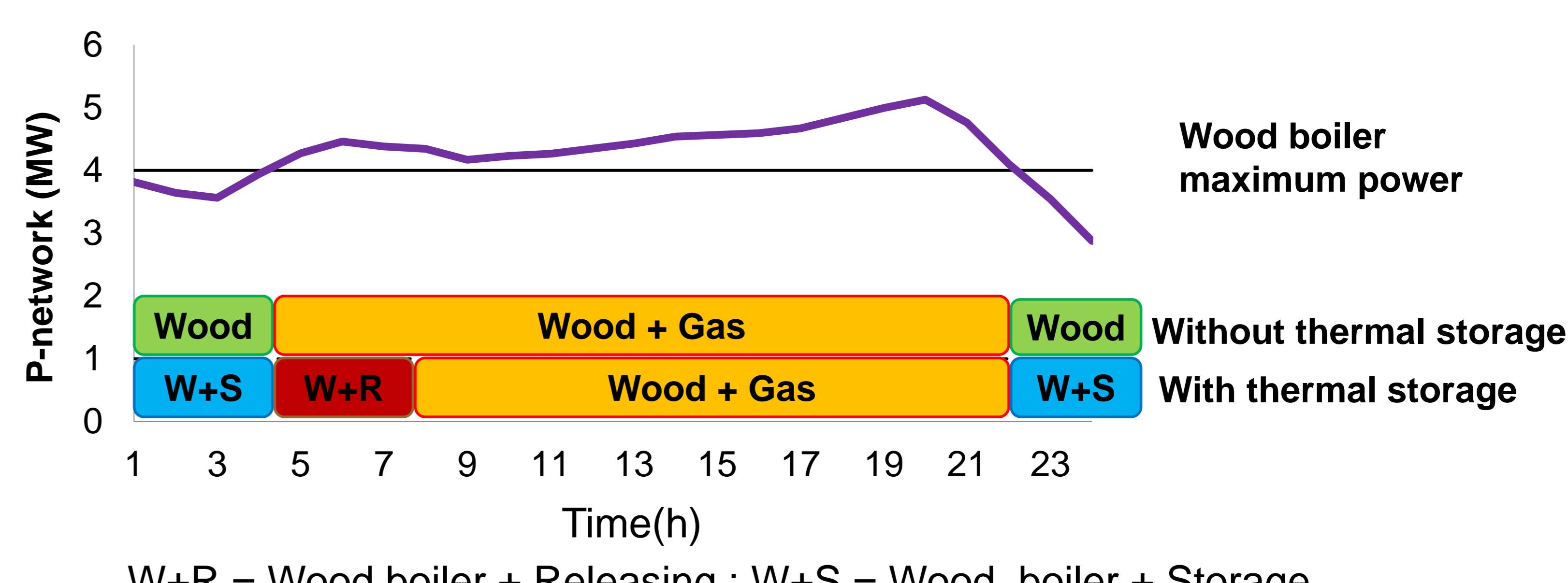


Multi-energy district boiler



WB: wood boiler ; GB1, GB2: gas boilers

Multi-energy district boiler operation



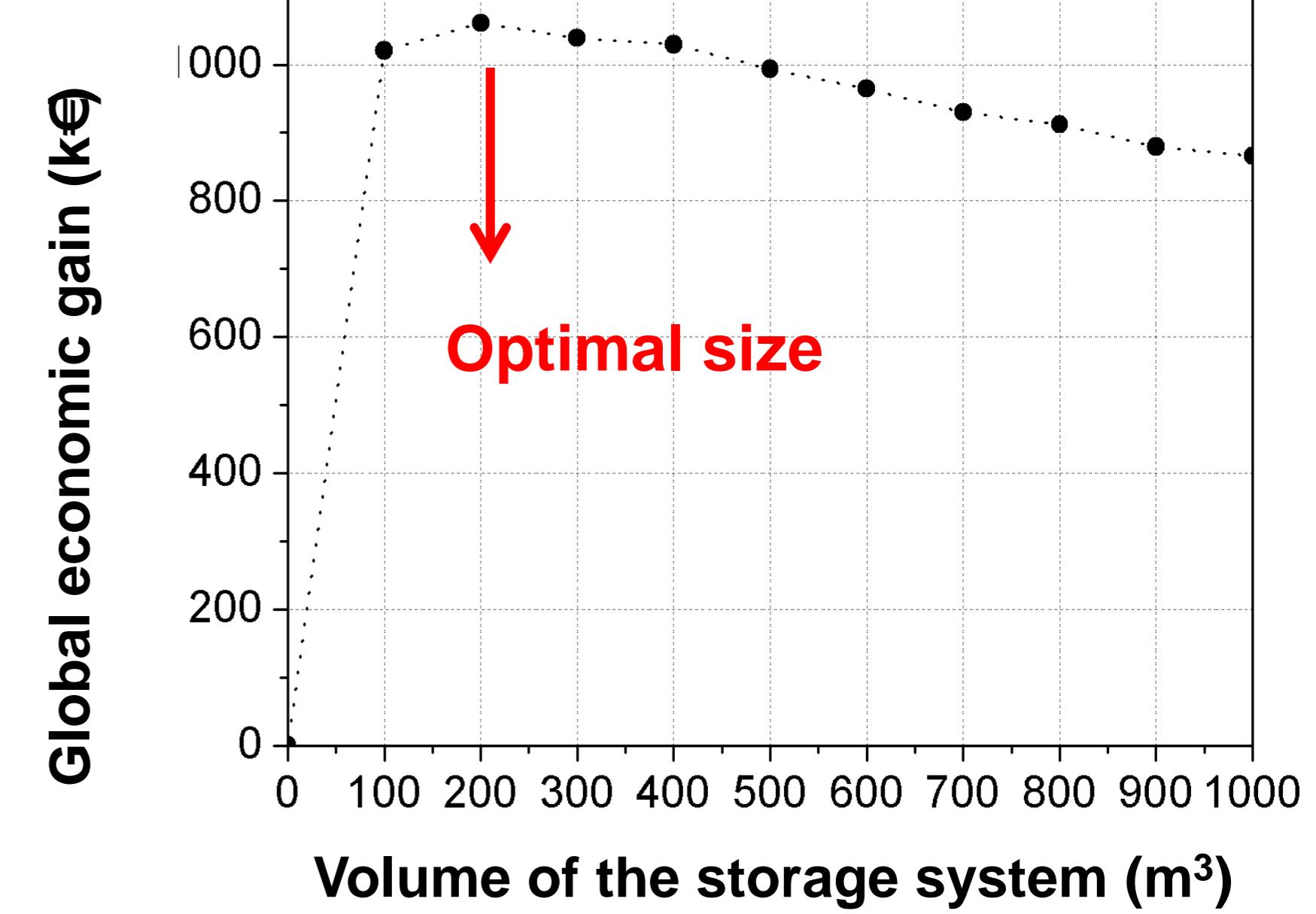
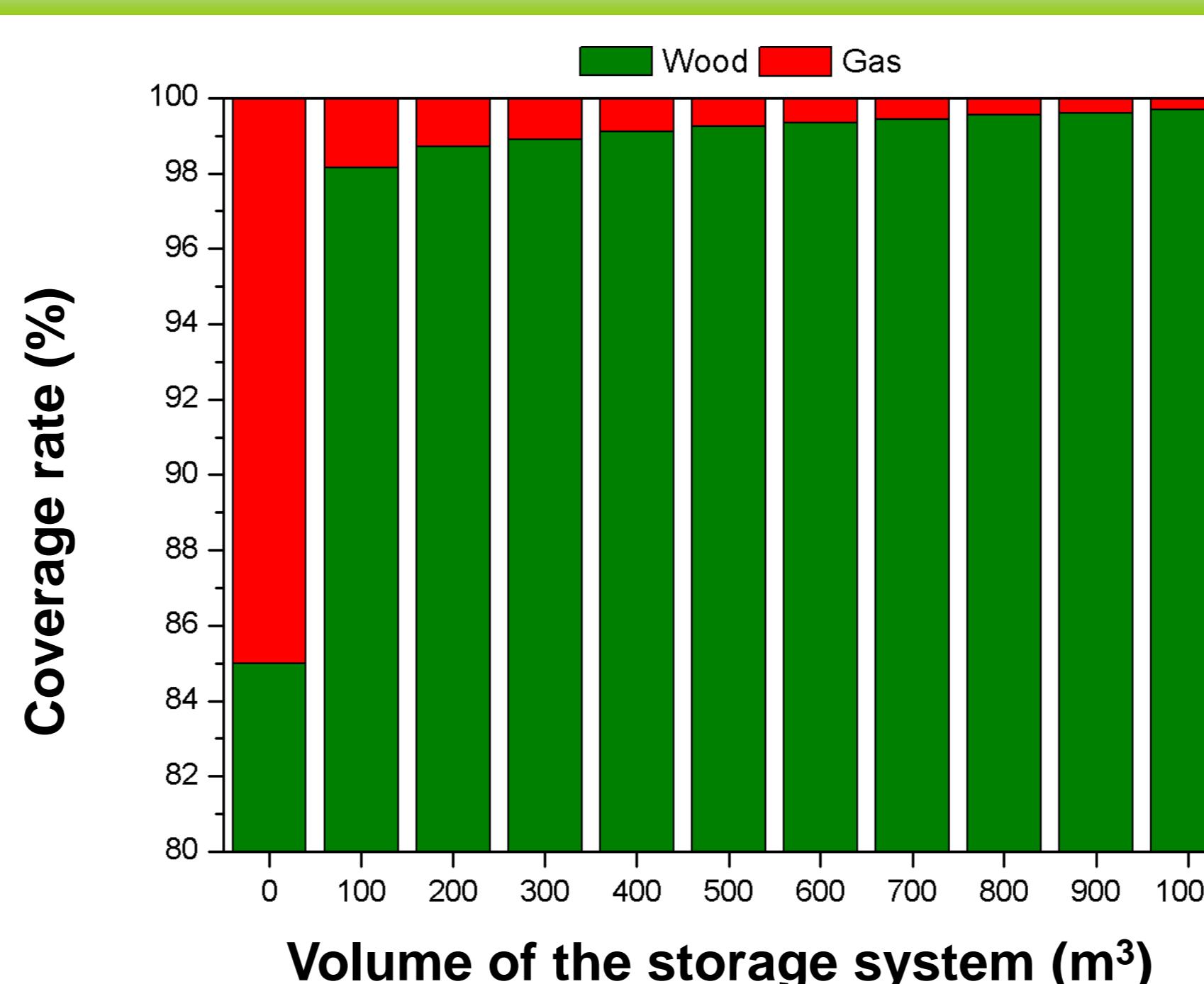
W+R = Wood boiler + Releasing ; W+S = Wood boiler + Storage

DESIGN OF THE THERMAL STORAGE TANK

Optimal size

Optimal size of the tank based on :

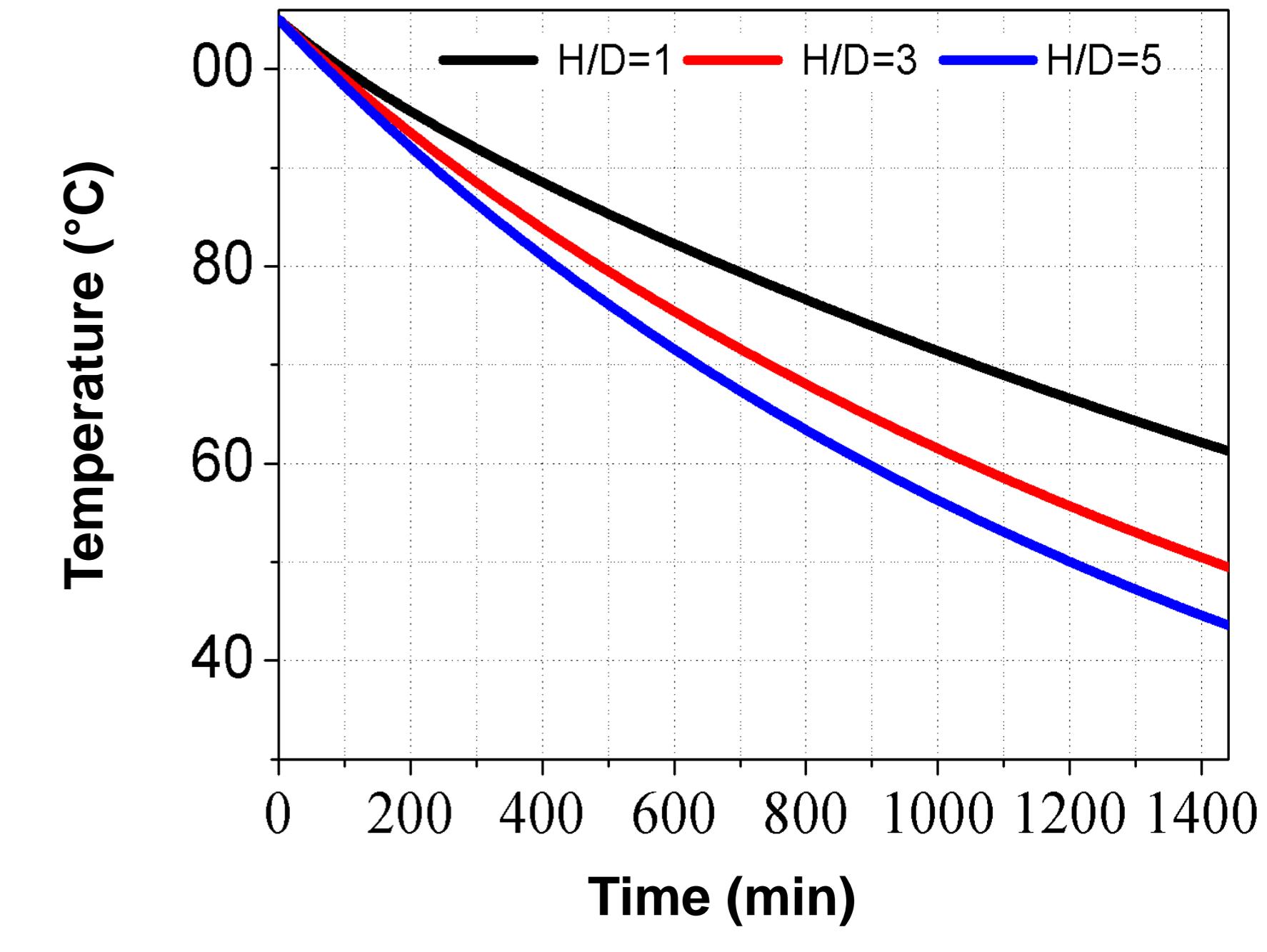
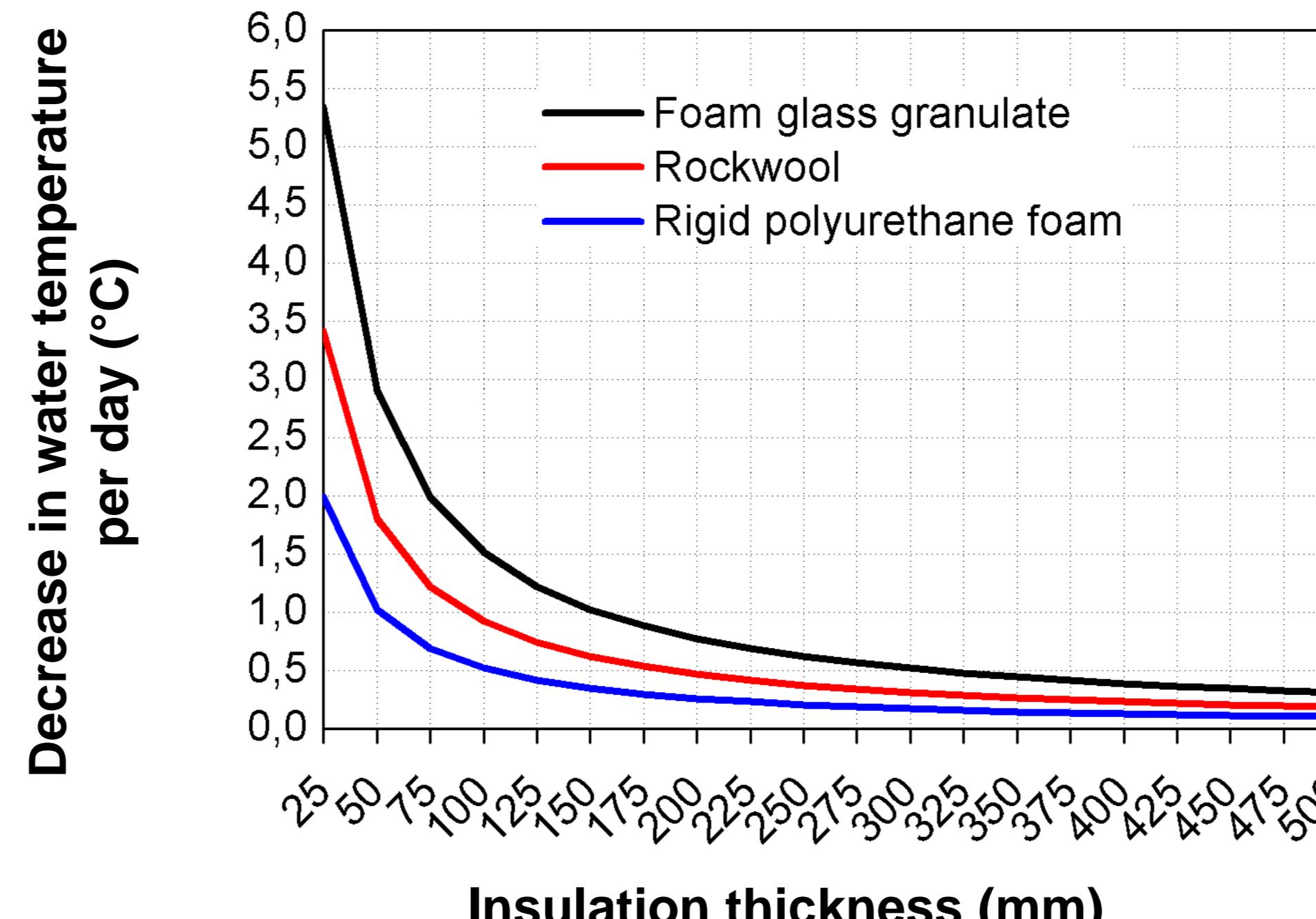
- Economic criterion (global economic gain)
- Energy criterion (wood coverage rate)



Geometrical characteristics and insulation

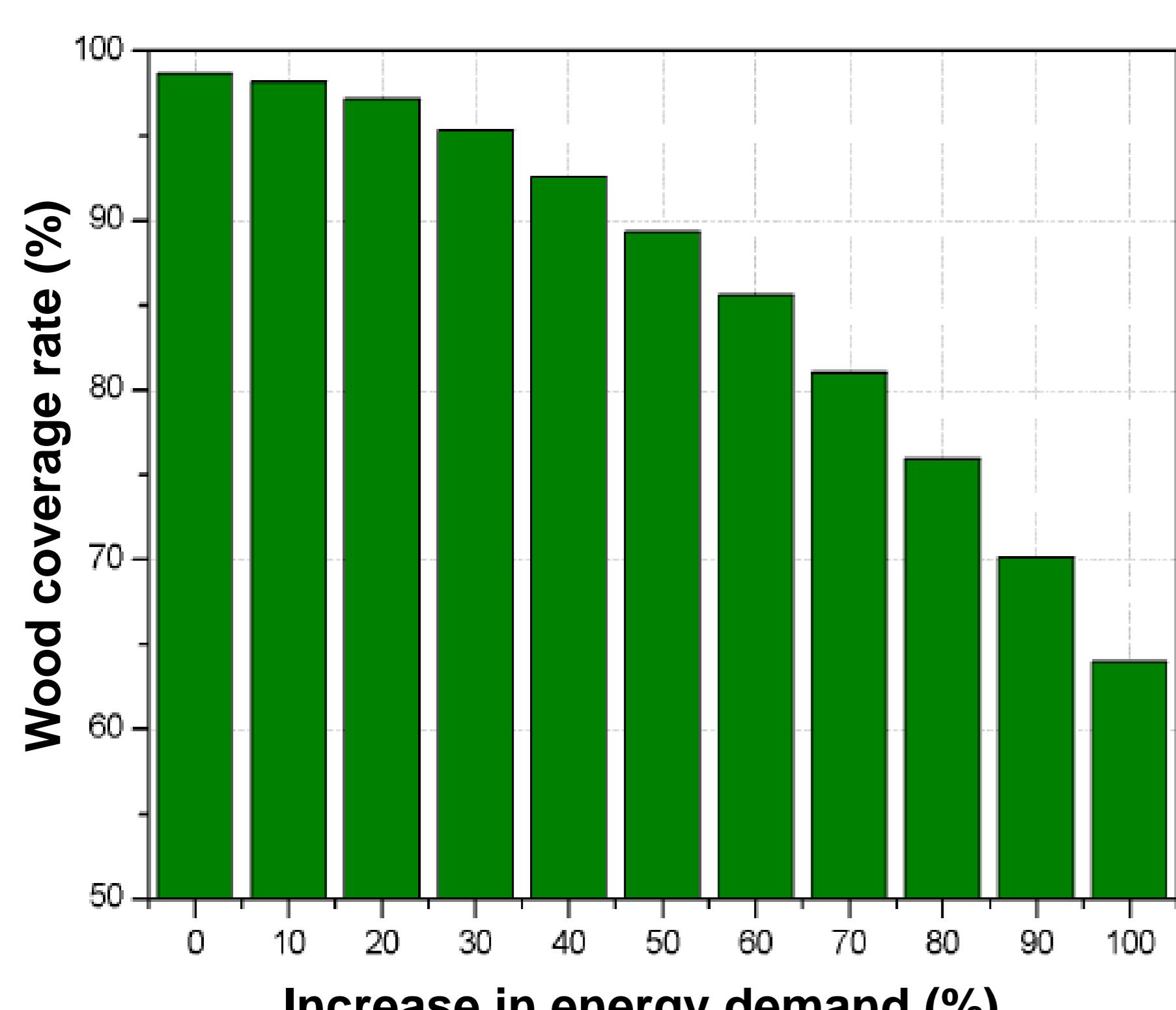
A model of the stratified water tank is developed to define:

- Geometrical characteristics (height, diameter)
- Insulation material



H: height, D: diameter

IMPACT OF THE THERMAL STORAGE TANK



Simulation results	
Location	Southwest France
Operating period	25 years
Annual heat demand	16 MWh
Optimal volume of the storage tank	200 m ³
Height of the storage tank	6.33 m
Diameter of the storage tank	6.33 m
Wood coverage rate without storage tank	85%
Wood coverage rate with storage tank	98.72%
Annual economic gain	48.3 k€
PayBack Period (PBP)	2 years
Global economic gain	1109.5 k€



Increase in wood coverage rate



Decrease in CO₂ emissions