

Chapter 9: Cost Modeling



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COST MODELING

Cost Functions have the following form:

$$C = \alpha \cdot V^{\beta}$$

where α and β represent cost parameters

C is the Total Cost (Euros)

V is the Volumen of Wastewater Treated (m³ / year)

For instance the correlation obtained for Valencia WWTPs is

$$C = 6.821 V^{0.659}$$

**The Unitary Cost decreases with the Volume of Wastewater Treated:
*Economy of Scale***

COST MODELING

More precise functions take into account influent quality: Extended Costs Functions

$$C = \alpha V^\beta e^{\sum v_i x_i}$$

where α , β , and $v_i \rightarrow$ Parameters

C is the Total Annual Cost

V is the Treated Volume (m^3/day)

x_i are indicator influent quality (SS, COD, BOD)

Treatment Costs

Primary Treatment

PROCESS	INVEST COSTS (€/m ³)	COSTS O&M (€/m ³)
Lamellar Settler	21 - 29	0.017 – 0.024

Treatment Costs

Secondary Treatment

PROCESS	INVESTMENT COSTS (€/e.h)	COSTS O&M (€/m ³)
Activated Sludge	300 - 400	0.3 – 0.7
Rotating Bioreactor	300	0.4
Filtration in load	25	0.15
Trickling Filter	200	0.2

Treatment Costs

Tertiary Treatment

PROCESS	INVEST COSTS	COSTS O&M (€/m ³)
Lagoon	10 €/m ³	0.05
Membrane Bioreactor	200 – 350 €/h.e	0.05-0.15
Infiltration - Percolation	125 - 300	0.05
Wetlands	14.10 €/h.e	0.05

Treatment Costs

Tertiary Treatment

PROCESS	INVEST COSTS (€/h.e)	COSTS O&M (€/m ³)
Filters	1 - 3	0.01 - 0.05
Lagoons	25 - 50	0.01
Wetlands	14.10 €/h.e	0.05

Treatment Costs

Tertiary Treatment

PROCESS	INVEST COSTS (€/h.e)	COSTS O&M (€/m ³)
Microfiltration	350 €/h.e	0.07 - 0.18
Ultrafiltration	200 €/m ³	0.10
Reversible Electrodialysis	120 – 300 €/m ³	0.15 – 0.40
Inverse osmosis	500 €/h.e	0.45-0.60

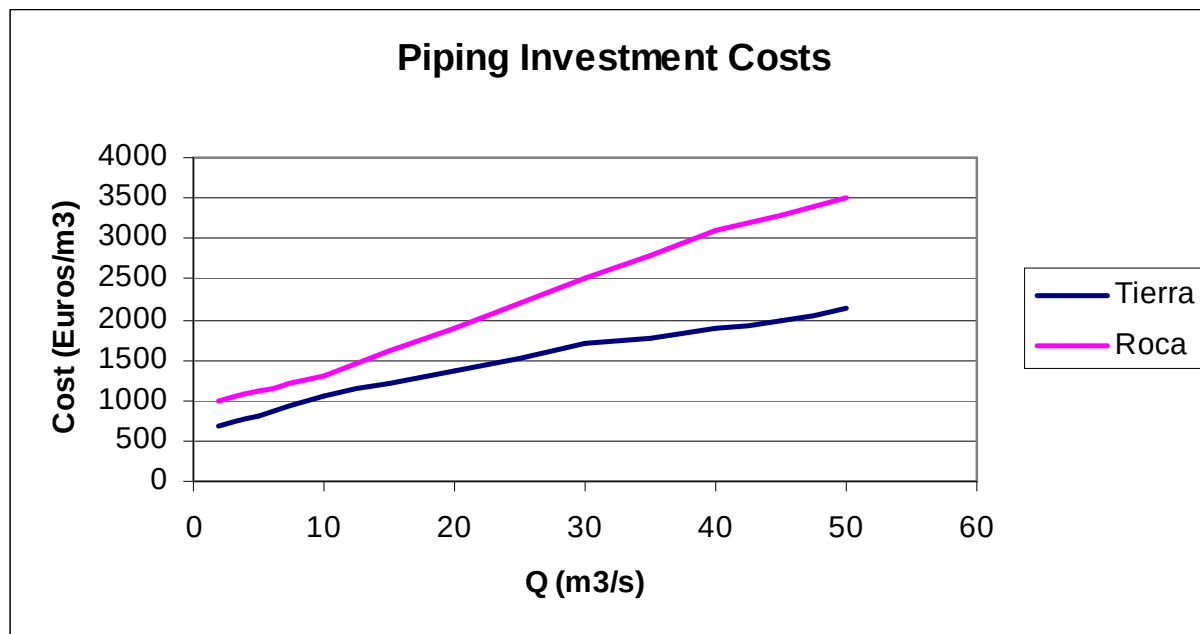
Treatment Costs

Disinfection Treatment

PROCESS	INVEST. COSTS	COSTS O&M (€/m ³)
CHLORINE	0.5 €/h.e	0.05
OZONE	1.2 €/h.e	0.6
ULTRAVIOLET	4 – 9 €/m ³	0.004

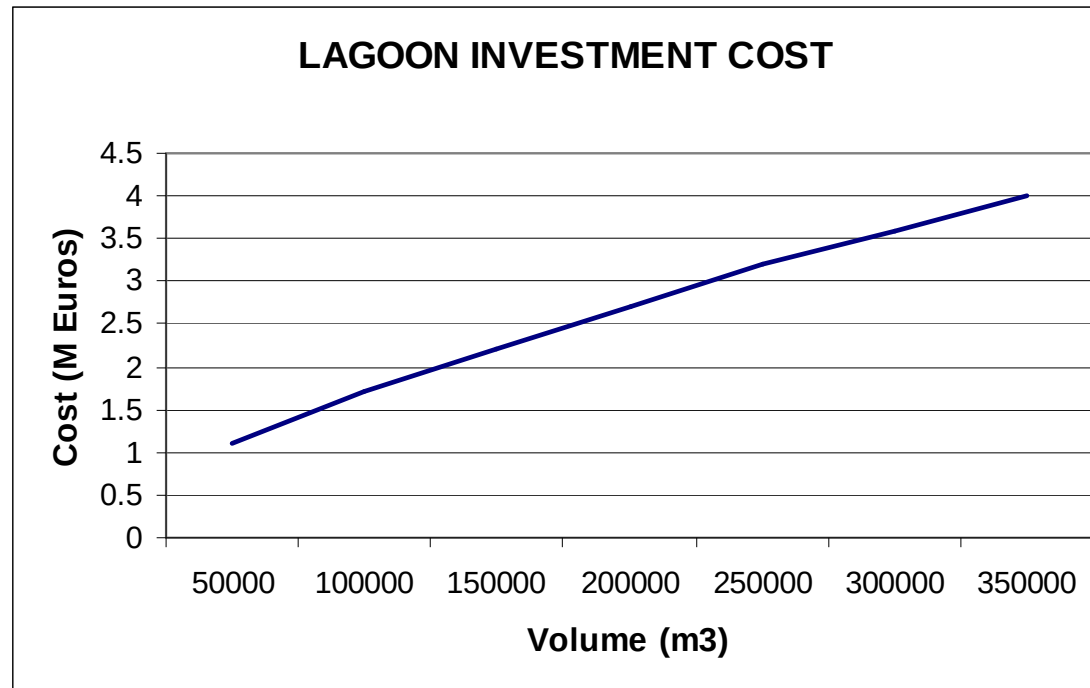
Treatment Costs

Piping Investment Cost



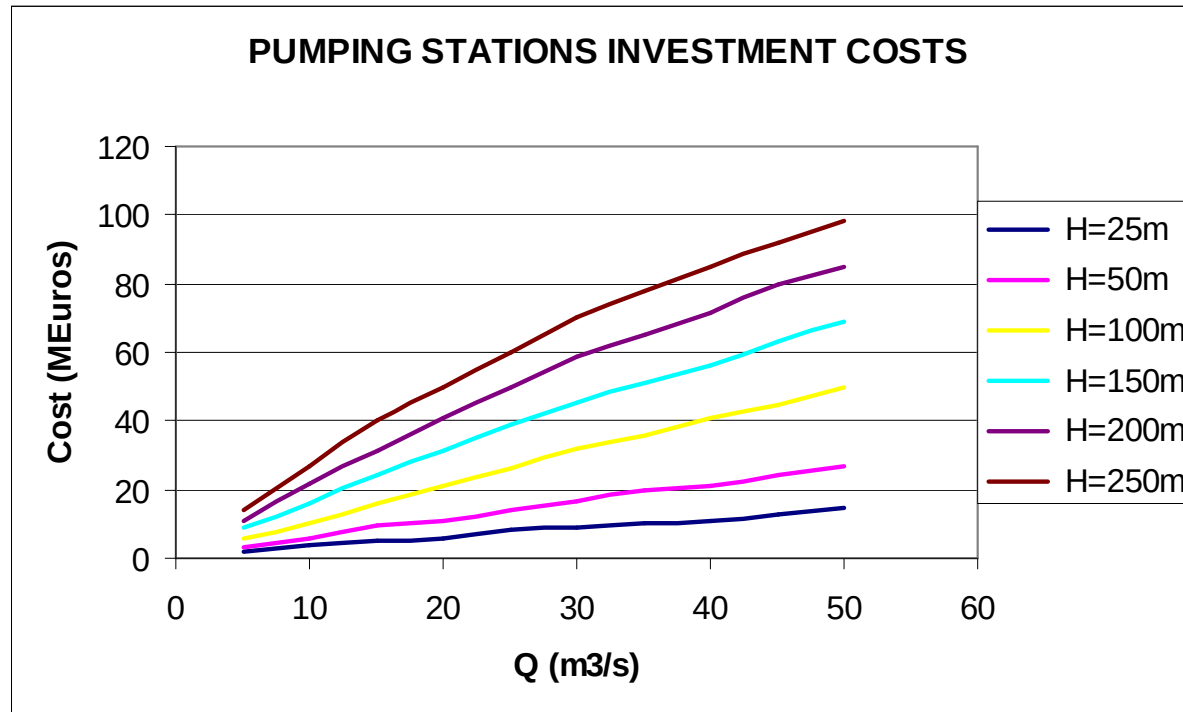
Running Costs: 1.2 % Investment Cost

Treatment Costs



COSTES DE EXPLOTACIÓN: 1.2 % del coste de inversión

Treatment Costs



**COSTES EXPLOTACIÓN: 1.2 % del coste de inversión más el
consumo energético: 0.07-0.09 €/kwh**