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School of Civil Engineering (ETSICCP)



ETS INGENIEROS DE CAMINOS,
CANALES Y PUERTOS

MASTER THESIS : FEASIBILITY STUDY FOR A HYDROPOWER PROJECT IN THE TAJO-SEGURA CHANNEL IN THE RAPID OF BELMONTEJO MUNICIPALITY (CUENCA)

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Abstract:

This work treats the feasibility study for a hydropower project in the Tajo-Segura channel which is located in the rapid of Belmontejo Municipality in the province Cuenca. It is a feasibility study that will be used to compare various design options and select the most interesting one. The possibilities to build a hydropower plant in this area are examined regarding the topography of the area, the flow characteristics of the river, the types of turbines and the costs-benefits ratio. With reference to these fields, the most optimal solution in this case is found.

Location:

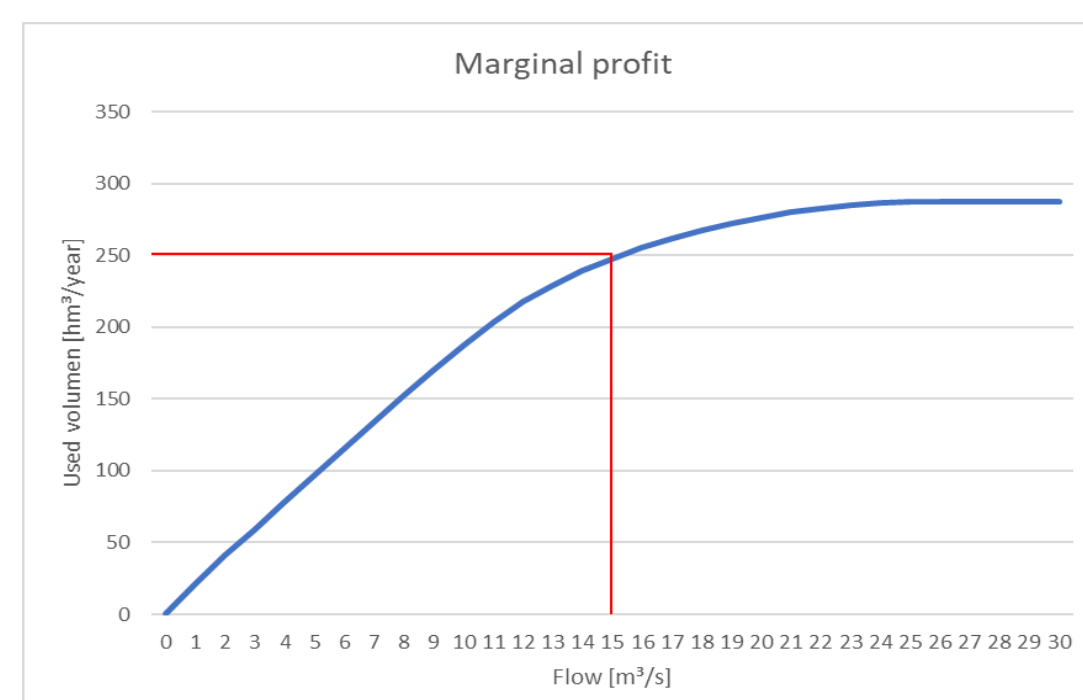
the the rapid of Belmontejo of the Tajo-Segura channel is located in the river basin district Júcar in the east of Spain. More specifically the channel is located in the south of the province Cuenca and in the north of the reservoir Alarcón.



Flow:

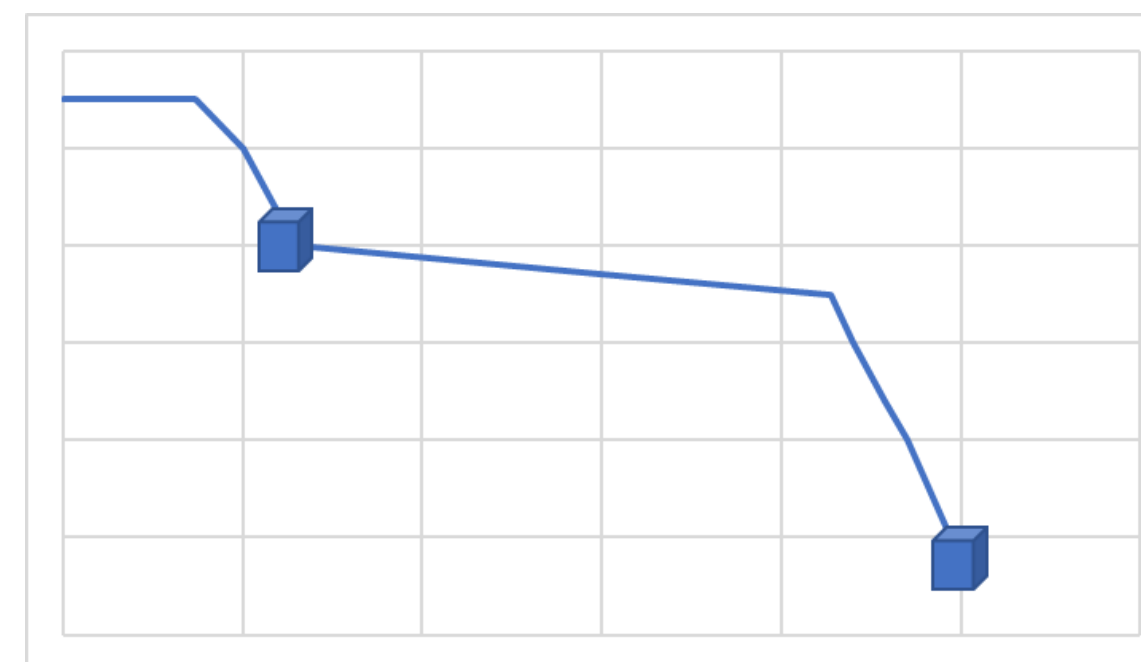
The used flow is $15\text{m}^3/\text{s}$.

The marginal profit does increase a lot until this point.



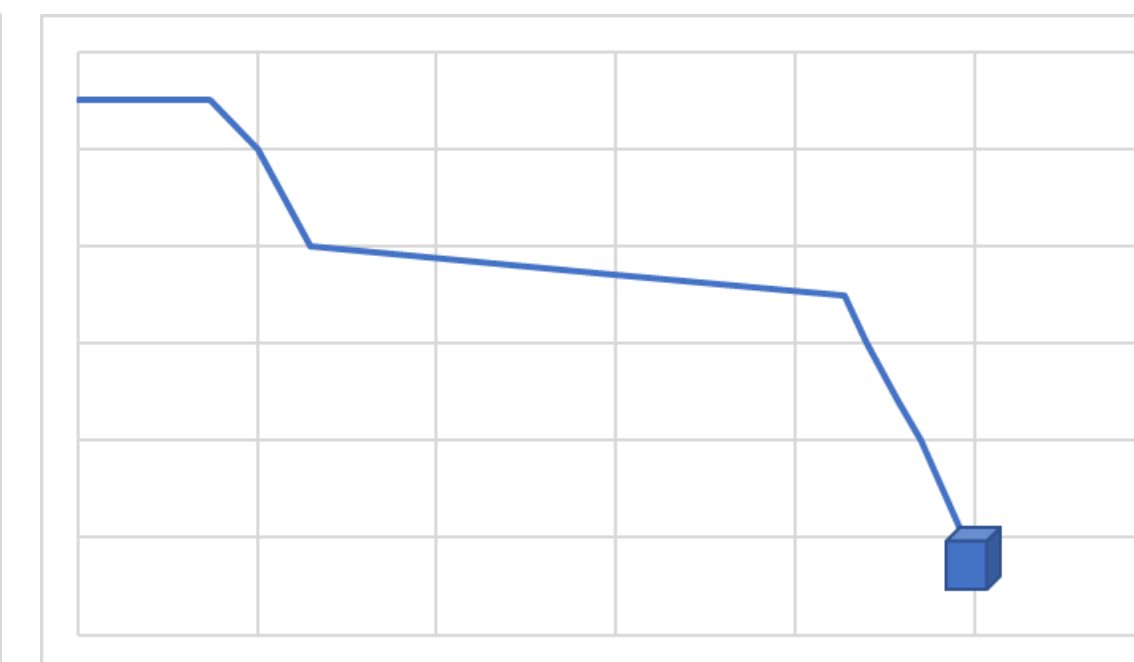
Solutions :

Solution 1:



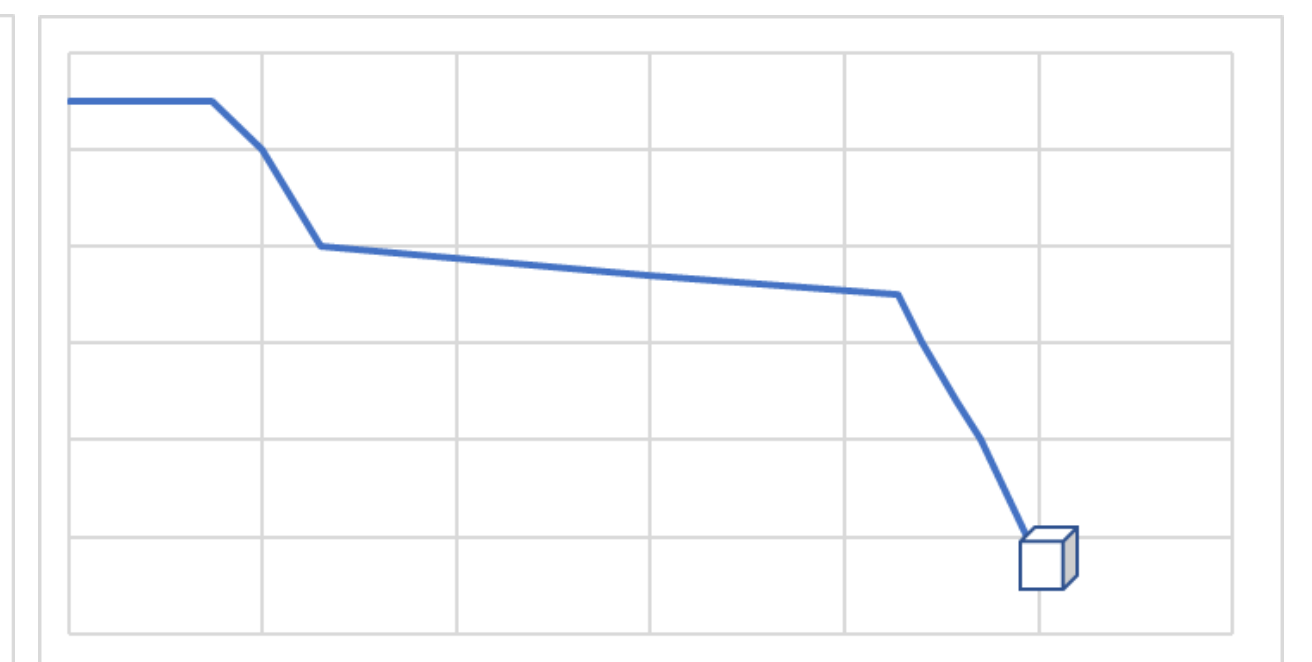
- Working 24 hours a day
- 2 rapids with a head of 15 and 30m
- Flow of $15\text{m}^3/\text{s}$

Solution 2:



- Working 24 hours a day
- 1 rapid with a head of 50m
- Flow of $15\text{m}^3/\text{s}$

Solution 3:



- Working 6 or 8 hours a day
- 1 rapid with a head of 50m
- Flow of 60 or $45\text{m}^3/\text{s}$

Conclusion:

	Benefits a year [€/year]	Turbine cost [€]	Tube \varnothing [m]	Tube length [m]	Reservoir capacity [m^3]	Excavation volume [m^3]
Solution 1	1 329 801	540 000	3	630	Min	2400
Solution 2	1 477 558	325 000	3	2100	Min	1200
Solution 3	1 592 242	430 000/385 000	5	2100	972000/864000	1150/1500

Because of its high one-time initial costs, and its little benefits a year, the first solution can be seen as the least advantageous solution of the three. Whereas the second solution has less construction costs, one can say that the second solution is more interesting than the third one. Thus the second solution can be seen as the most advantageous in this situation.