Transición energética en la 4ta revolución industrial
Technical and economic approach of electricity generation using the Medellin (AMVA) aqueduct network.

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Contents

I. Introduction

II. Theoretical aspects

III. Proposed methodology

IV. Results

V. Conclusions

VI. Questions
I. Introduction

- General idea
- Location
- Network of aqueduct
- Case of study
II. Theoretical aspects

\[ h_f = 10.67 \times \frac{Q}{C} \times \frac{L}{D^{4.87}} \]
Friction loss (1)

\[ P = \rho \times g \times Q \times h \]
Hydraulic power (2)

\[ Q = V \times A \]
Flow (3)

\[ V = \frac{x\% \times V_{max}}{138\%} \]
Speed interpolation (4)
III. Proposed methodology

1. Identification of key points

2. Pipe measurement

3. Friction loss calculation

4. Hydraulic power calculation

5. Energy production cost calculation

6. Energy sale calculation
IV. Results

Hydropower generation ideal

T1  T7  T12  T14  T28  T41  T69  T78
Accumulated energy per hour turbine ideal

119.28
IV. Results

Hydropower generation Lucidpipe

- T1
- T3
- T5
- T9
- T10
- T11
- T18
- T19
- T20
- T21
- T24
- T34
- T35
III. Conclusions

The generation is directly affected by two parameters: the length of the sections and; and the flow that each pipe transports.

Currently there are not many internal turbines that control the pressure.

The city has a great potential (119.276,07 kWh-day) due to its mountainous topography.

For more accurate calculations, more precise real-time data are needed.

The current technologies do not allow to exploit all the potential that comes with harvesting energy from the network.

This generation system could provide a percentage of electrical energy for the operation of the aqueduct itself, making these networks more resilient systems.
VI. Questions
General idea
CROSS SECTION VALLE ABURRA
The topographic potential for energy harvesting from the water supply network is visualized.
Network of Aqueduct
Case of study

Portland – LUCID PIPE
1. Identification of key points