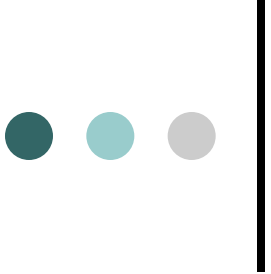


# Analysis of a project viability of a water losses reduction plan in Piracicaba city, Brazil



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# Definition of the sector, the case study, the national and local context

- The sector of water and waste water supply has great importance for the **urban development** of cities all over the world.
- The city has more than **368 843 inhabitants**
- Huge **industrial sector** (e.g. Hyundai Motors)
- The major challenges affecting water utility of the city of Piracicaba:
  - High **water losses** index
  - Rapid **population growth** (increased demand for water)
  - Huge regional **water scarcity**
  - Rapid **urbanization** (need of infrastructural extension for water supply)
  - **Aging** water supply infrastructures (leakage, pipe failure)



**Piracicaba city**

**BRAZIL**

**SP State**





# Regulatory framework of the sector

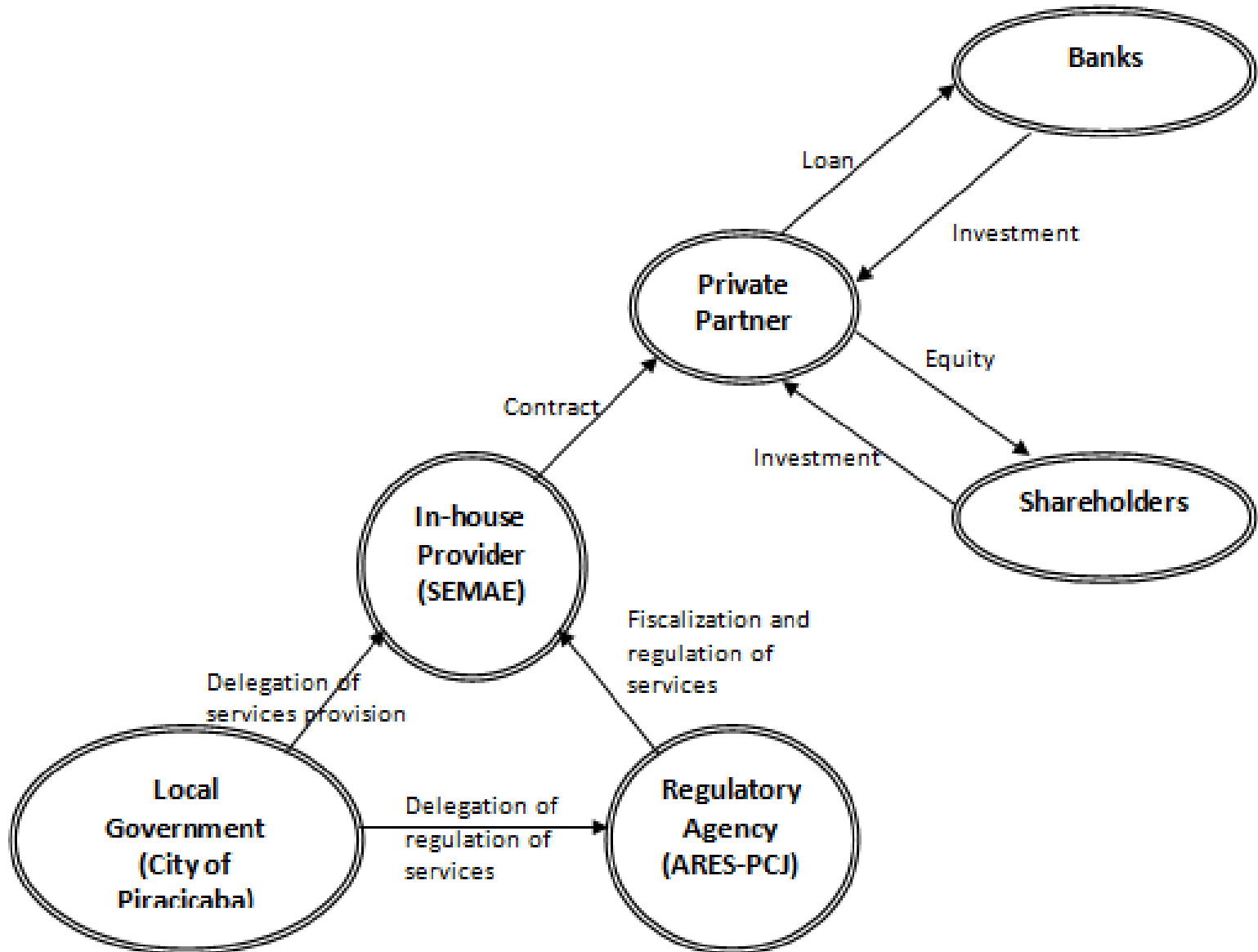
- The sector of water and waste water supply in Brazil is regulated by **Federal Law 11445/2007**.
- The Law states that the local municipalities are obligated to provide the services and can either **directly provide services or delegate** them through the concession contract to the private sector.
- Each city is entitled to establish its own regulator, however in 2013, **out of 5.570 municipalities only 2.716 were regulated**.



# FIELD Analysis

PLAYERS	INCENTIVES (Institutional/ <i>shadow</i> )	RELATIONSHIP	INFORMATION
<b>Politicians</b> Local Government (City of Piracicaba)	Efficiency in provision of water service	Control of the Regulatory Agency	The information from Regulatory Agency on the results of services
<b>Public Officials</b> The Mayor of the City of Piracicaba	<i>Electoral consensus</i>	Appointment of the CEO of the In-house Company	The information from Regulatory Agency on the results of services
<b>Market Actors</b> In-house Company SEMAE (city owned)	Balance between profits and efficiency in service provision	- Reporting to the Regulatory Agency - Obtaining the loan from bank	Information from Private partner on - Industrial cost - Investment costs - Physical assets - Revenues
<b>Market Actors</b> Private partner (PPP)	Profits	Meeting the requirements of Regulatory Agency	Information on - Industrial cost - Investment costs - Physical assets - Revenues
<b>Market Actors</b> Banks (investor)	Return of investments	Provision of loan to Private partner	Information on return of investments
<b>Consumers</b>	- Effectiveness & quality - Low tariff	Accessibility & affordability of services	- Information on demand size and consumption volumes - Level of satisfaction with tariff and service quality
<b>Regulatory Agency</b>	- Efficiency in provision of water service - Reasonable tariff for consumers - Access to information from In-House Company	Regulation: price, quantity, quality	- Information on demand size - Information from In-house Company on Industrial cost Investment costs Physical assets Revenues

# FIELD Flowchart





# Case Study

- Piracicaba city Water Losses Reduction Plan (WLRP) presents investments in its water supply system in order to **reduce water losses**, concerning structures and devices to:
  - Reducing **water pressure**;
  - Replacing **pipes**;
  - **Monitoring** devices (meters);
  - Replacing old **consumer meters**.





# Definition of the investment

Project	Investment (BRL)	Estimated recovered water (m <sup>3</sup> /month)	Investment duration (months)	Payback considering actual revenue tariffs (months)
1	9.646.245,23	191.657	24	28
2	5.233.591,02	120.422	18	25
3	4.548.904,77	14.834	16	173

- This work considers just the projects with **better payback relations**: Projects 1 and 2
- Project 3 has high investment needs but a **lower estimated recovery** and therefore is **not attractive to private investors** and it should be done with funding of the public provider (SEMAE)



# Chosen regulatory instrument

- The regulatory instrument chosen is a **Internal Rate of Return (IRR)**.
- IRR was chosen to be **more attractive** to the investors, since:
  - The **financial integrity** of the private company is always guaranteed;
  - The regulator **can monitor** private **company's profits**; and
  - The private company is permanently stimulated to be **more efficient** and increase the quality of the final services.

# Operational costs (2009)

A	Personnel costs of the public provider (BRL)	22.089.585,00
B	Materials and other operational costs (BRL)	8.179.059,00
C	Total costs (BRL)	30.268.644,00
D	Water network lenght (km)	3.392,88
E	Sewage network lenght (km)	2.714,30
F	Total network lenght (km) (W+S)	6.107,18
$G = A * (D / F)$	Personnel costs (WATER) (BRL)	12.271.991,67
$H = B * (D / F)$	Materials and other operational costs (WATER) (BRL)	4.543.921,67
$I = G + H$	Total costs (WATER) (BRL)	16.815.913,33
$J = G / D$	Specific personnel cost (BRL/km.year)	3.616,98
$K = H / D$	Specific material and other costs (BRL/km.year)	1.339,25
$L = J + K$	Total specific cost (BRL/km.year)	4.956,24

# Operational costs (2009)

<b>OPERATIONAL COSTS OF THE PROJECT 1</b>	
<b>Network lenght (km)</b>	<b>1.697,34</b>
<b>Personnel costs (BRL/year)</b>	<b>6.139.251,12</b>
<b>Materials and other operational costs (BRL/year)</b>	<b>2.273.166,16</b>
<b>Insurance (BRL/year) 1%</b>	<b>96.462,45</b>

<b>OPERATIONAL COSTS OF THE PROJECT 2</b>	
<b>Network lenght (km)</b>	<b>865,97</b>
<b>Personnel costs (BRL/year)</b>	<b>3.132.199,38</b>
<b>Materials and other operational costs (BRL/year)</b>	<b>1.159.752,14</b>
<b>Insurance (BRL/year) 1%</b>	<b>52.335,91</b>

# Calculation parameters

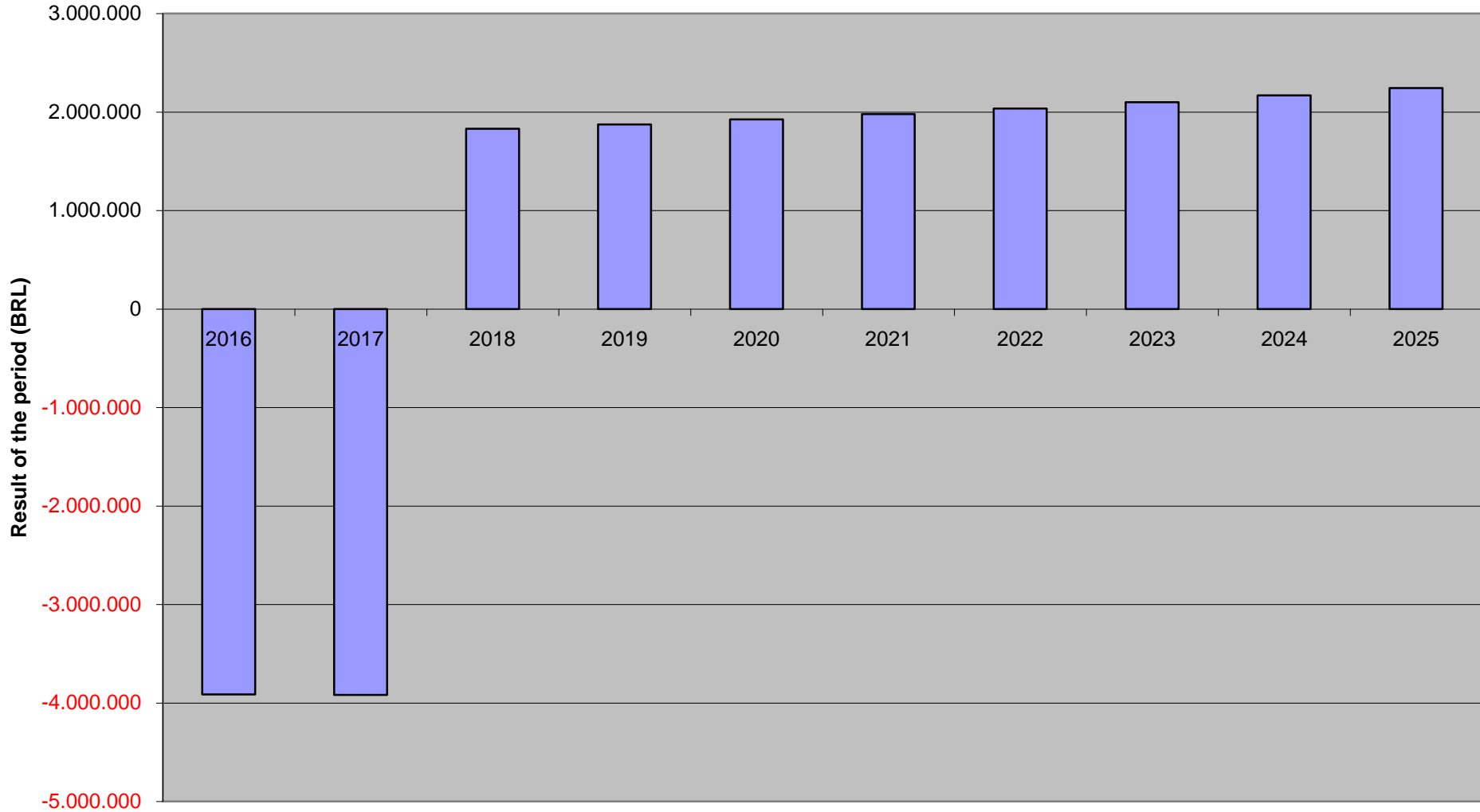
- Useful life: **10 years**
- Participation of equity (MVe): **20%** (assumed)
- Participation of loan (MVd): **80%** (assumed)
- Tax rate: **25%** (source: [www.pwc.com](http://www.pwc.com))
- Return of market portfolio (rm): **20%** (assumed)
- Government short-term Treasury bills (rf): **14,15%** (source: SELIC Brazilian rate – [www.bcb.gov.br](http://www.bcb.gov.br))
- Systematic risk ( $\beta$ ): **90%** (assumed)
- Minimum  $K_e = r_f + \beta (r_m - r_f) = \mathbf{19,42\%}$
- $K_d$  (Banks): **17%** (estimated value between  $K_e$  and  $r_f$ )

# Calculation parameters

- Weighted Average Cost of Capital (WACC) =  $[(MVe * Ke) + (MVd * Kd)] / 100\% = \mathbf{15,56\%}$
- Annual inflation in Brazil: 9,53% (source: [www.bcb.gov.br](http://www.bcb.gov.br), inflation in the last 12 months)
- Estimated annual increase of revenues: 11,53% (inflation + real annual increase of 2%)
- Estimated annual increase of costs: 11,53% (inflation + real annual increase of 2%)
- Selected Internal Rate of Return (IRR) to the project was **25%**

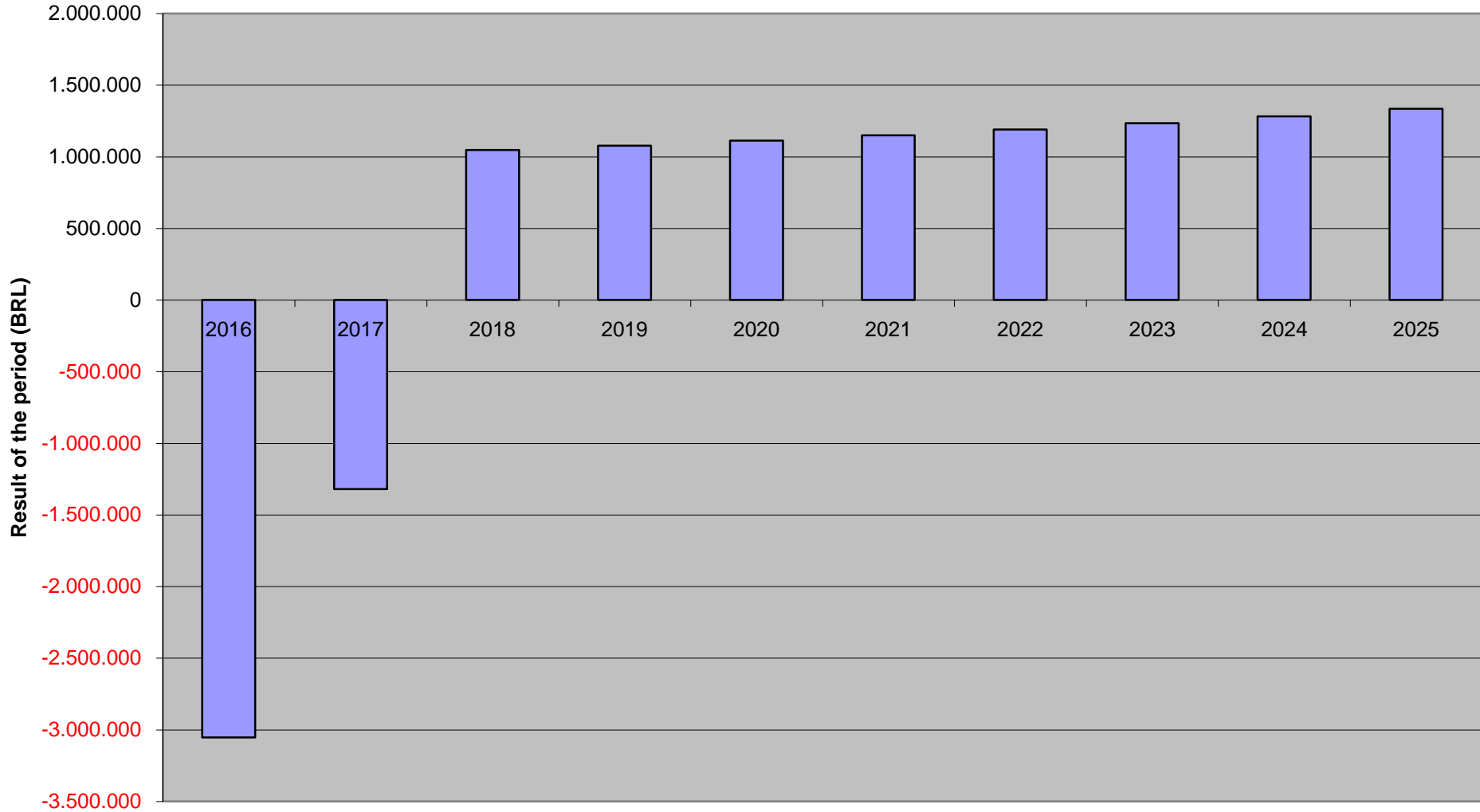
# Cash-flow – Project 1

PROJECT 1



# Cash-flow – Project 2

PROJECT 2







# Tariffs

- To each cash flow the Net Present Value (NPV) was set to zero, assuring the IRR to investors (25%)
- Calculations were made using an electronic worksheet (Microsoft Excel) and its tool Solver, resulting:
  - **Project 1: BRL 0,96/m<sup>3</sup>**
  - **Project 2: BRL 0,65/m<sup>3</sup>**



# Conclusions

- Resulting “tariffs” to be paid to the private partner **are lower** than the minimum tariff applied by the public company to final consumers = **BRL 1,35/m<sup>3</sup>**
- Average tariff in Piracicaba city = **BRL 1,78/m<sup>3</sup>**
- Average tariff in Brazilian cities = **BRL 2,62/m<sup>3</sup>**
- Since the Piracicaba GDP per capita is higher than Brazilian average, we can conclude that the **actual and calculated tariffs are not excessive.**
- However, further study is needed into the public company to **assure a healthy** public-private partnership

● ● ● | Any questions?

**Thank you for your attention!**  
**Muito obrigado pela sua atenção!**  
**Merci pour votre aimable attention!**

**Nazarynyzga rakhmet!**

**Shukriya!**

**Hvala na pažnji!**

