



METRO  
DE MEDELLÍN  
CALIDAD DE VIDA

# Urban ropeways: a sustainable transport option



metrodemedellin



# Content

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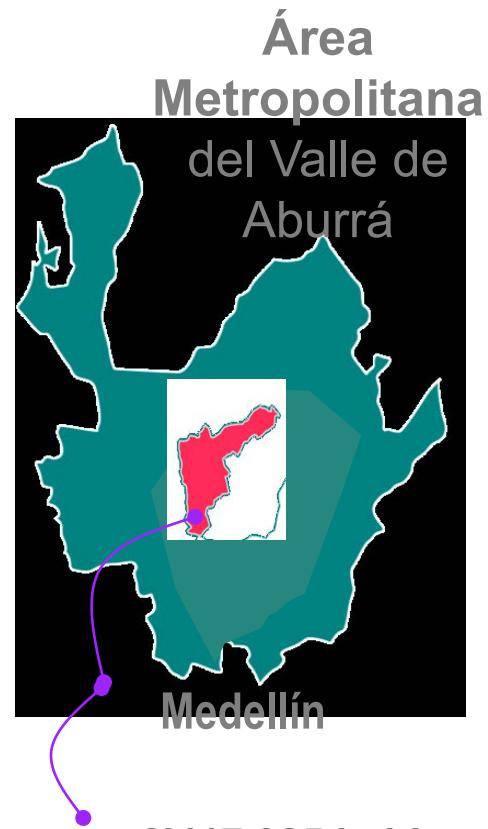
**5. Conclusions**

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# 1. About us

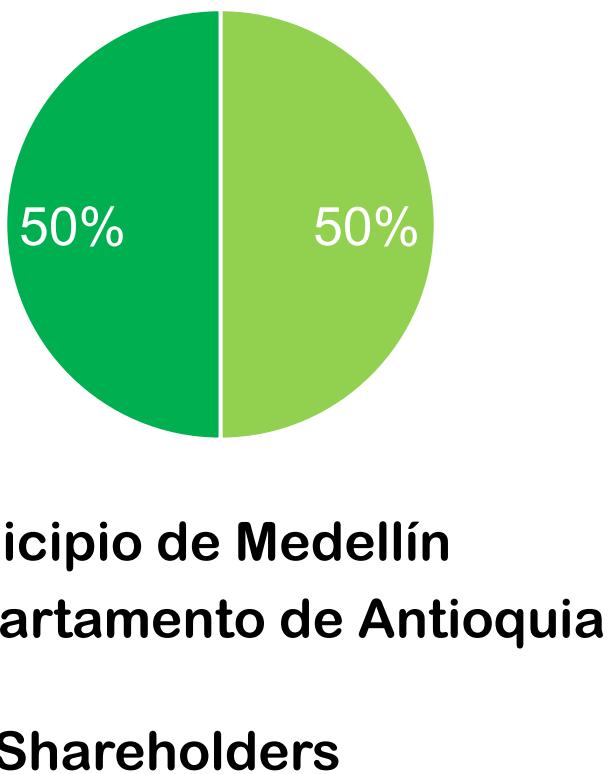


# Colombia context



2'417.325 habitantes  
3'638.869 en el Área Metropolitana  
380.34 Km<sup>2</sup> de extensión

# Legal nature



Empresa de Transporte Masivo del Valle de Aburrá Limitada is a limited liability company between entities of public law, which for its operation is governed by the rules established for industrial and commercial enterprises of the State, Law 489 of 1989.

# Urban articulating and integrating territory system





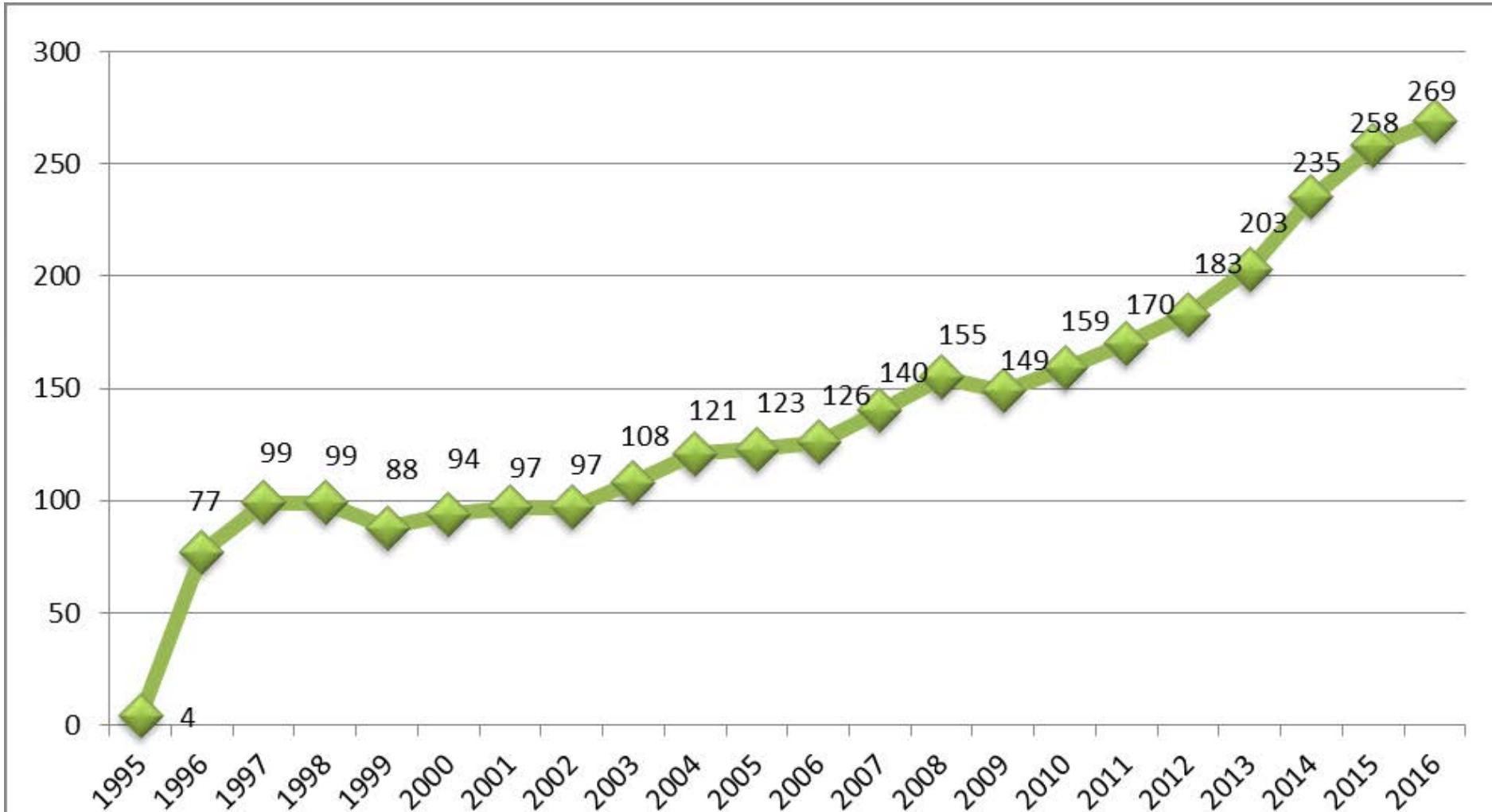
# Lines, technology, capacity

A	B	K	J	L	H
Férreo	Férreo	Cable aéreo	Cable aéreo	Cable aéreo	Cable aéreo
Vagón <b>400</b> usuarios	Vagón <b>400</b> usuarios	Telecabina <b>10</b> 8 sentados, 2 de pie			

M	1 BUS	2 BUS	T-A	TOTAL
				 3 transportation modes 10 lines
Telecabina <b>10</b> 8 sentados, 2 de pie	Bus articulado <b>160</b> usuarios	Bus padrón <b>100</b> usuarios	Tranvía <b>300</b> usuarios	N/A



# Millions of passengers



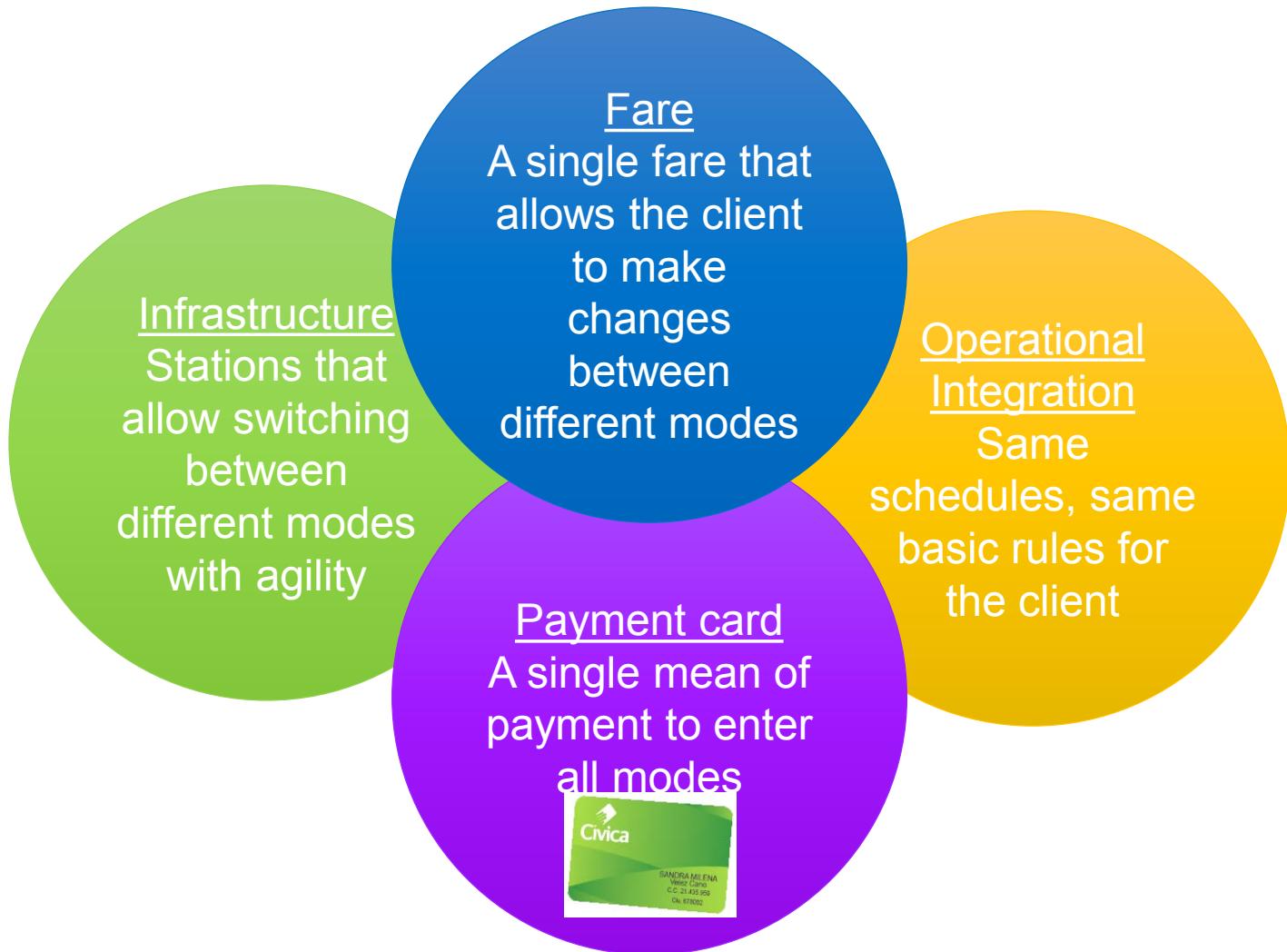


# Technical characteristics

Characteristics	Línea K	Línea J	Línea L	Línea H	Línea M
System	MGD-10	MGD-10	MGD-10	MGD-10	MGD-10
Opening year	2004	2008	2010	2016	2018
Length (m.)	2070	2764	4618	1409	1057
Speed (m/s)	5	5	5,8	5	5
Vertical rise (m.)	400	320	613	197	275
Towers	20	31	23	10	11
Power(KW)	1260	1260	680	530	530
Capacity (pas/h.)	3000	3000	1200	1800	2500
Track width (m.)	5,7	5,7	5,7	6,1	6,1
Stations	4	4	2	3	3
Cabins	93	119	57	42	49



# Considerations for integration





# Considerations for integration



Vista Línea K - Estación Andalucía



# Considerations for integration



Vista Línea K – Integración Estación Acevedo



# Considerations for integration



Vista Línea H – Integración Estación Oriente



# Considerations for integration



Vista Línea J – Integración Estación San Javier

## 2. Urban ropeways implantation

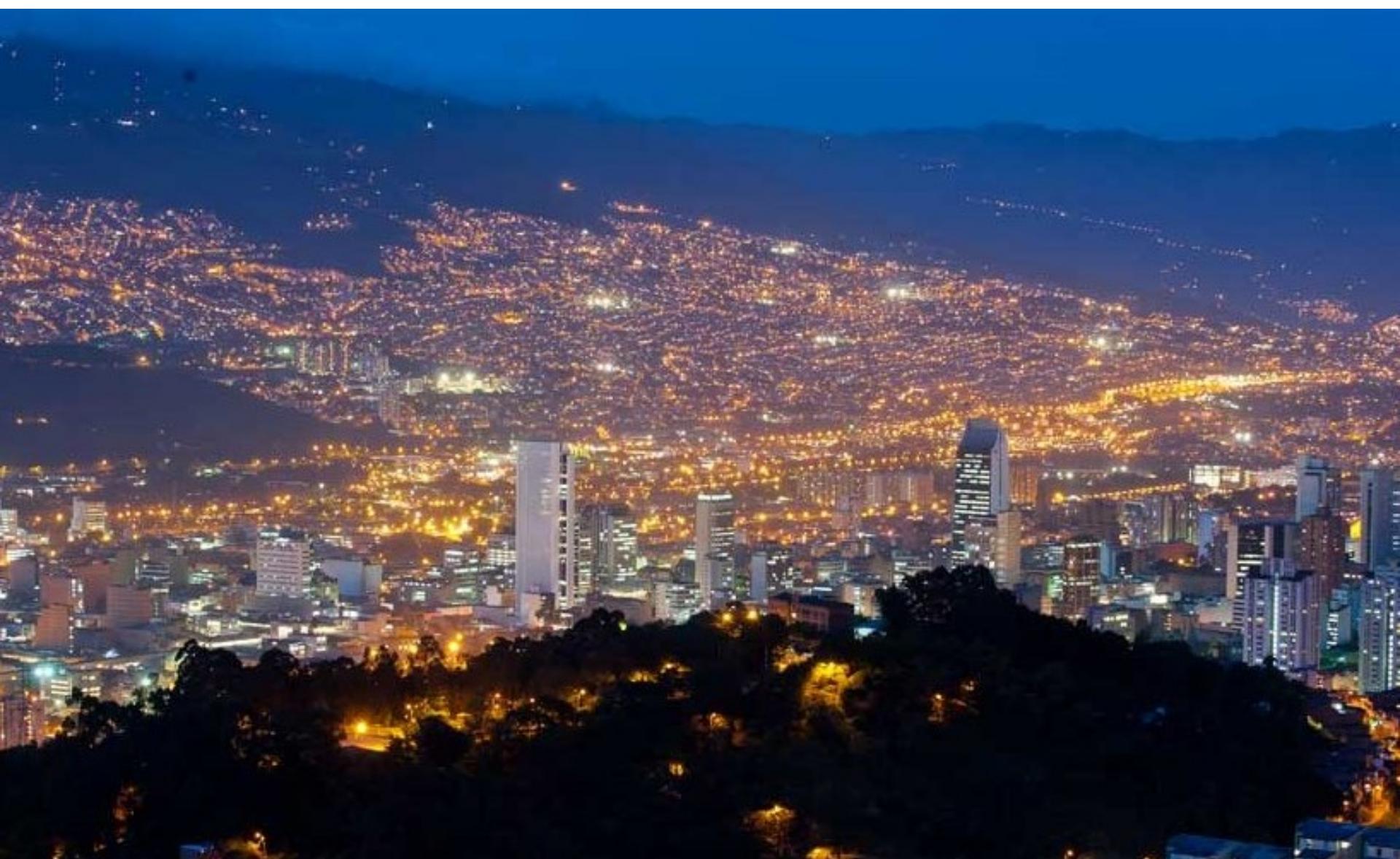


# Our region





# Our region





# Our region



# Metro system



Línea A

Línea B

Niquía – La Estrella  
San Antonio – San Javier



Línea J

Línea K

Línea L

Línea M

Línea H

San Javier – La Aurora  
Acevedo – Santo Domingo  
Santo Domingo – Arví  
Miraflores – Trece de Nov  
Alejandro E – La Sierra



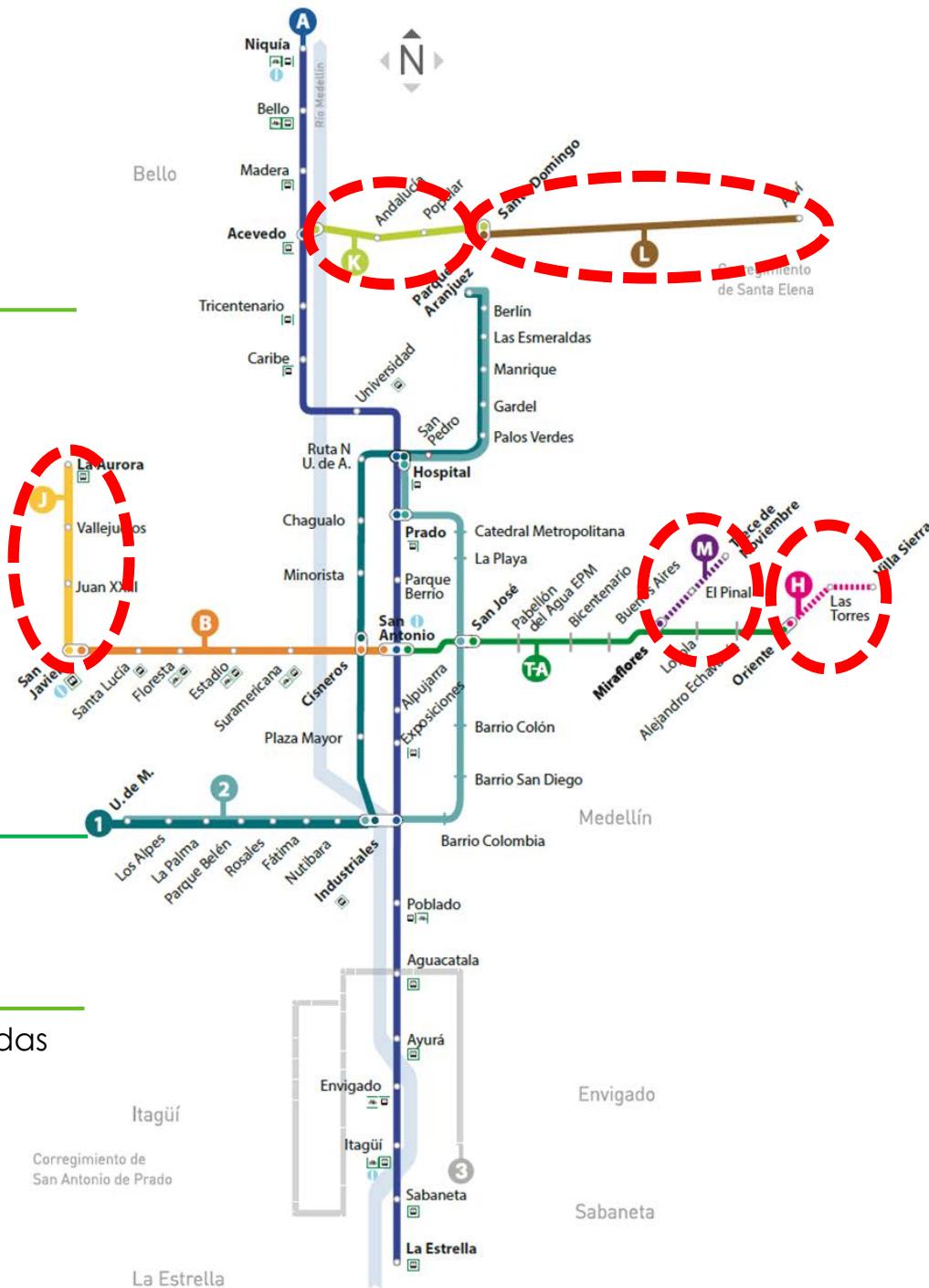
U. de M. - Parque de Aranjuez

Línea 1 Av. Ferrocarril

Línea 2 Av. Oriental



Línea TA San Antonio - Miraflores



## Otros medios



Alimentadores  
Cuencas 3 y 6

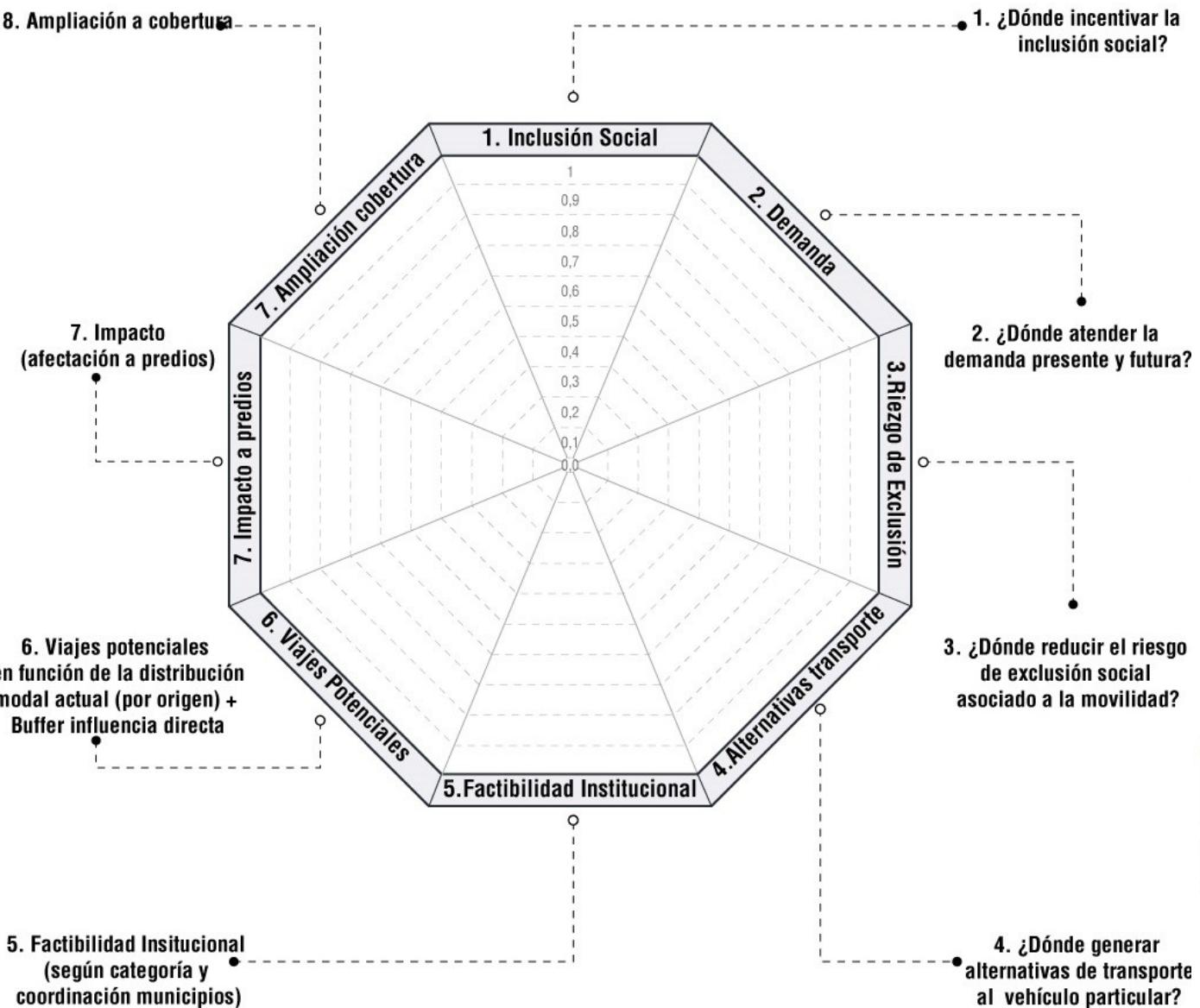


Rutas integradas  
143



Parqueaderos

# Corridors prioritization criteria

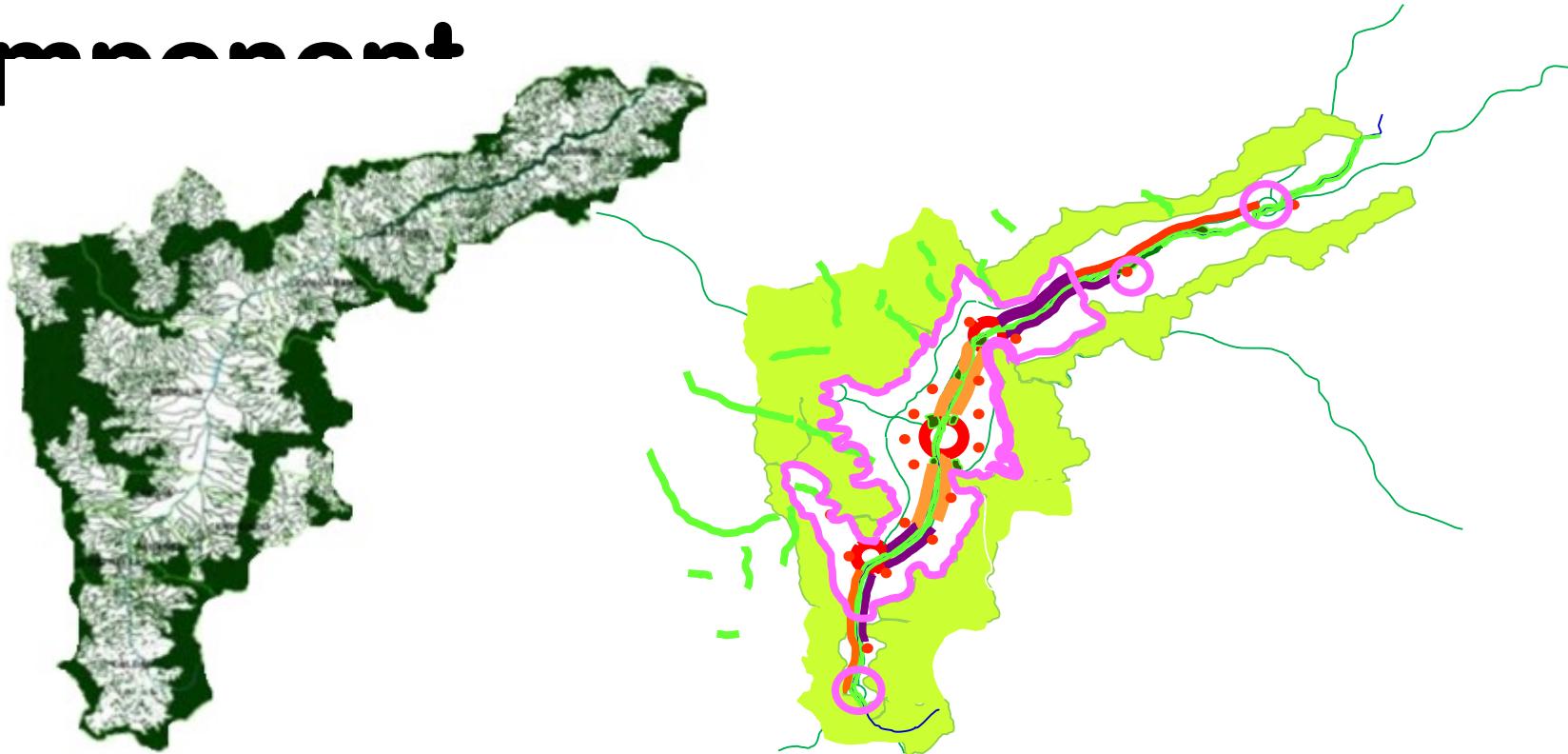


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# Land use model – Metropolitan component



One that attends the new global demands in environmental, technological, turistic, logistic and leisure matters, while working in reducing social inequality associated to land use, contributing to the consolidation of a metropolitan territory integrated on its mobility and that promotes the conservation of its natural basis and cares about inherit new generations, a territory that is socially equilibrated, globally connected and ecologically sustainable.

# Land use model – Metropolitan component



Looking for anticipate future demands set by local and regional planning

Modelo de Ocupación POT Medellín

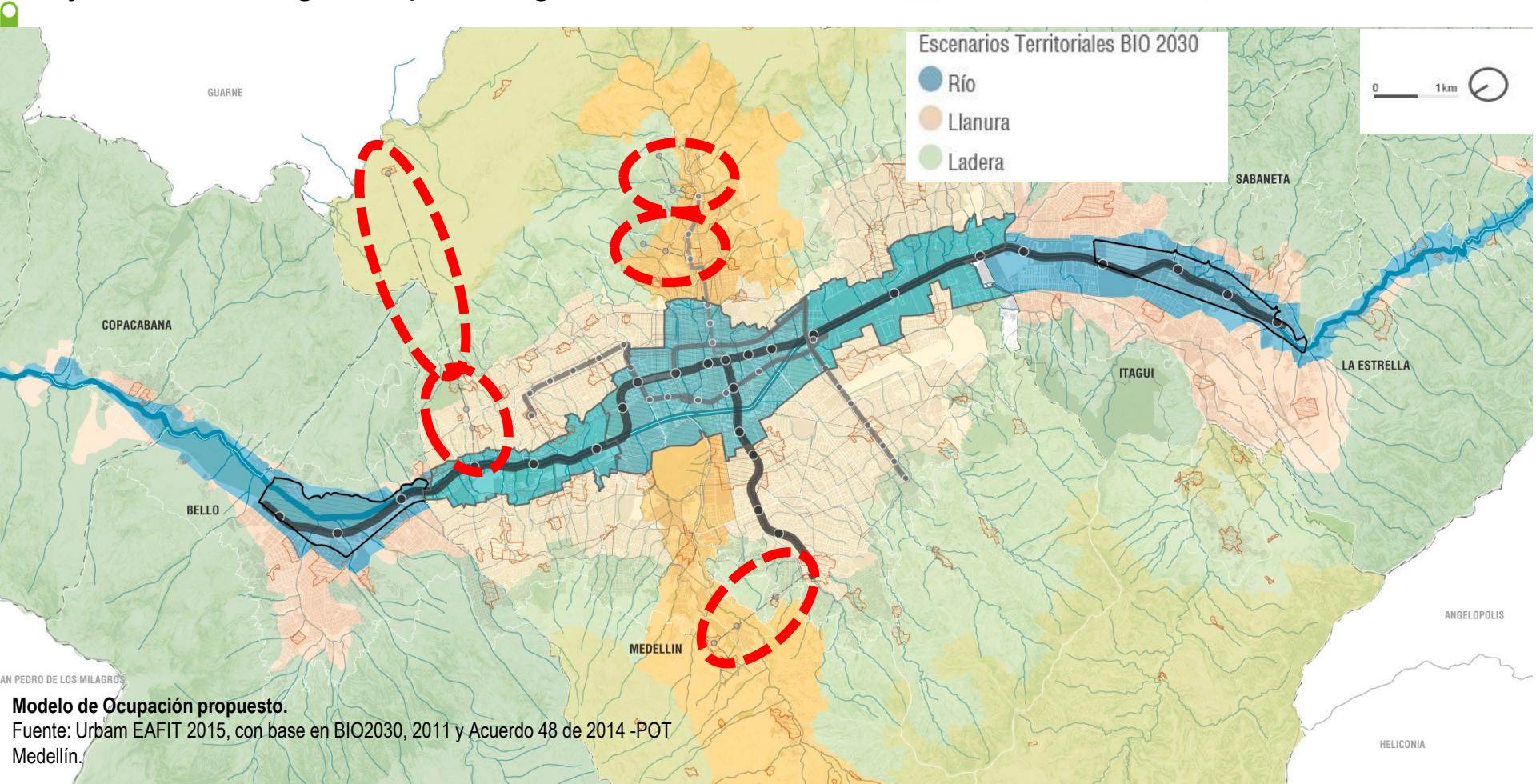
Corredor del río Aburrá

Transversalidades

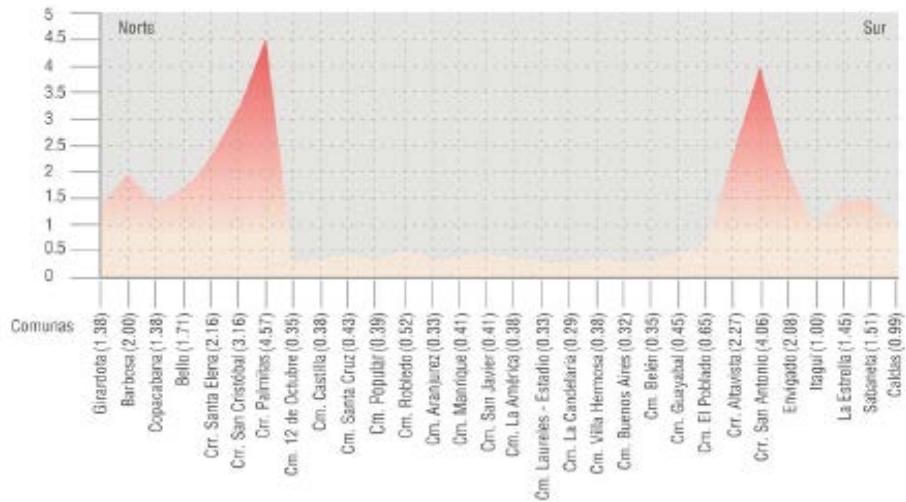
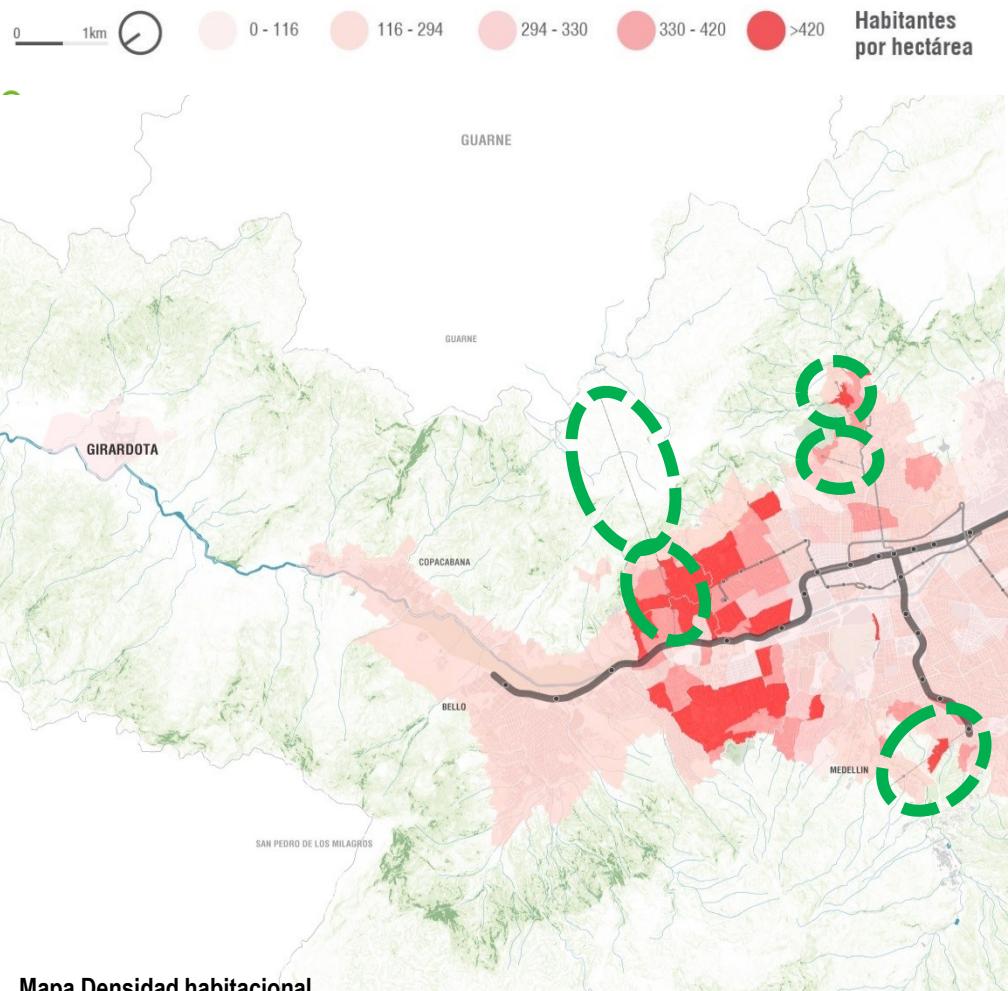
Borde urbano-rural

Sistema de centralidades

Zonas heterogéneas de media ladera

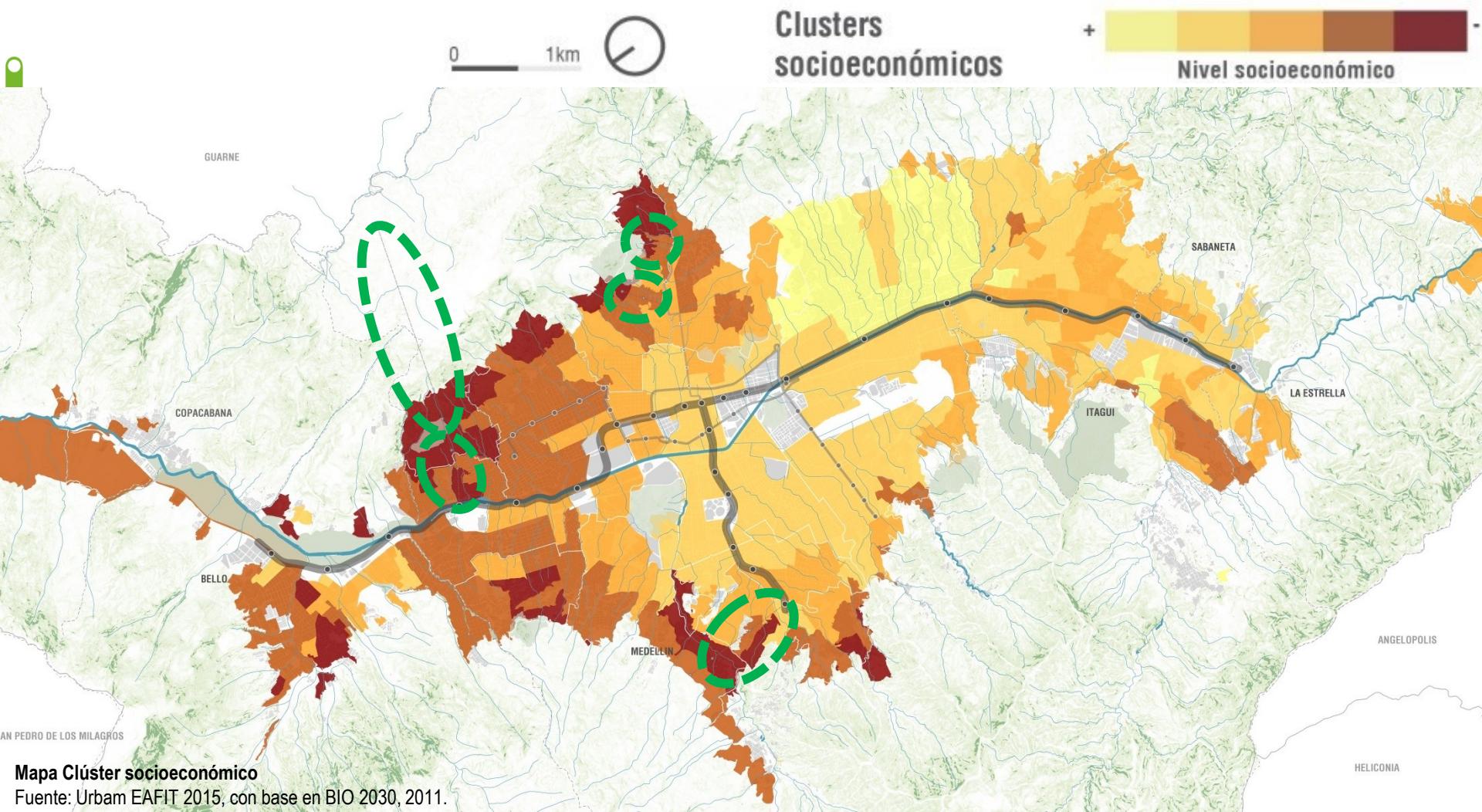


# Land use model – Metropolitan component



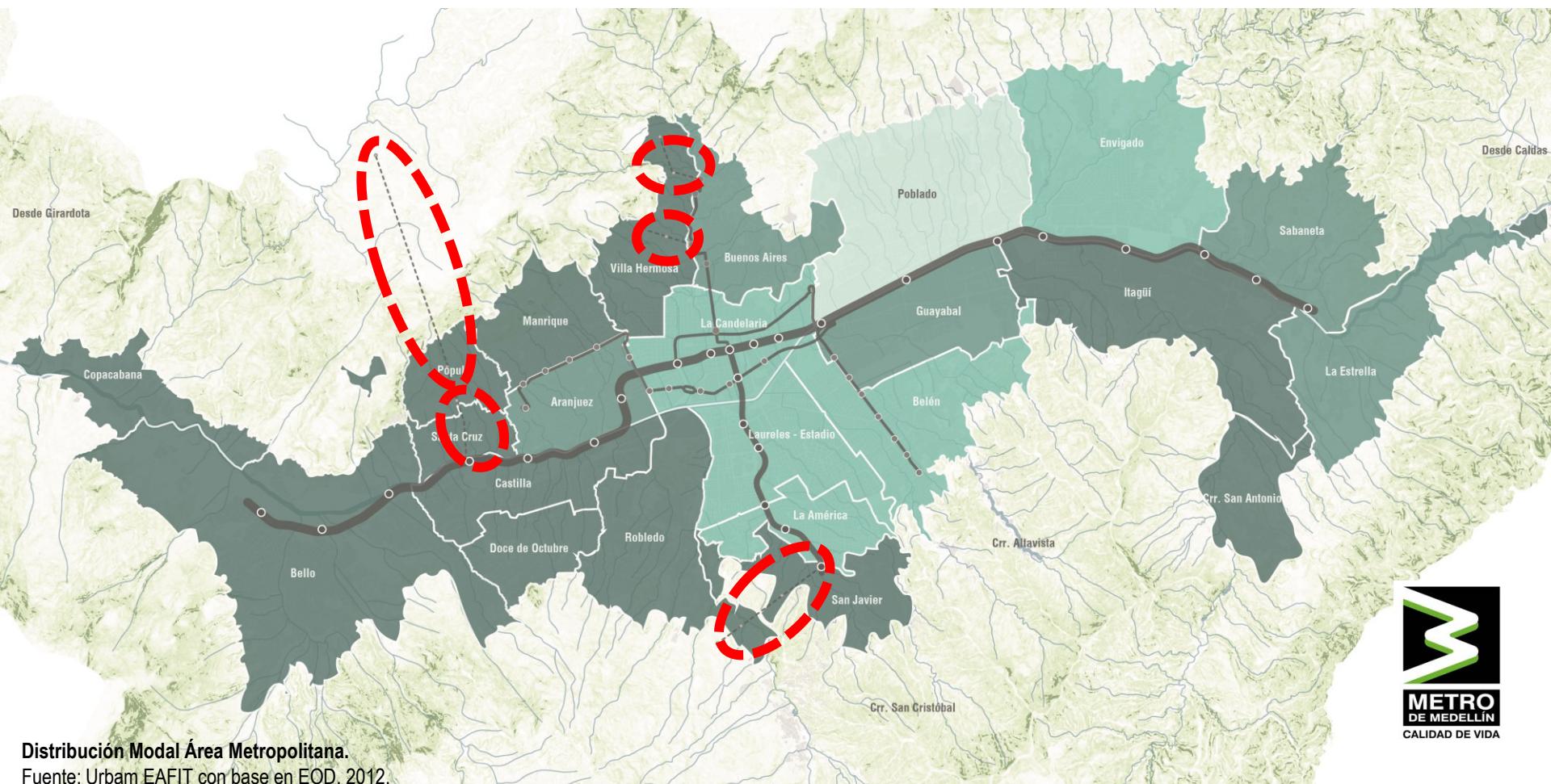
Higher population growth in the suburbs

# Social – economical segregation





# Public Transport



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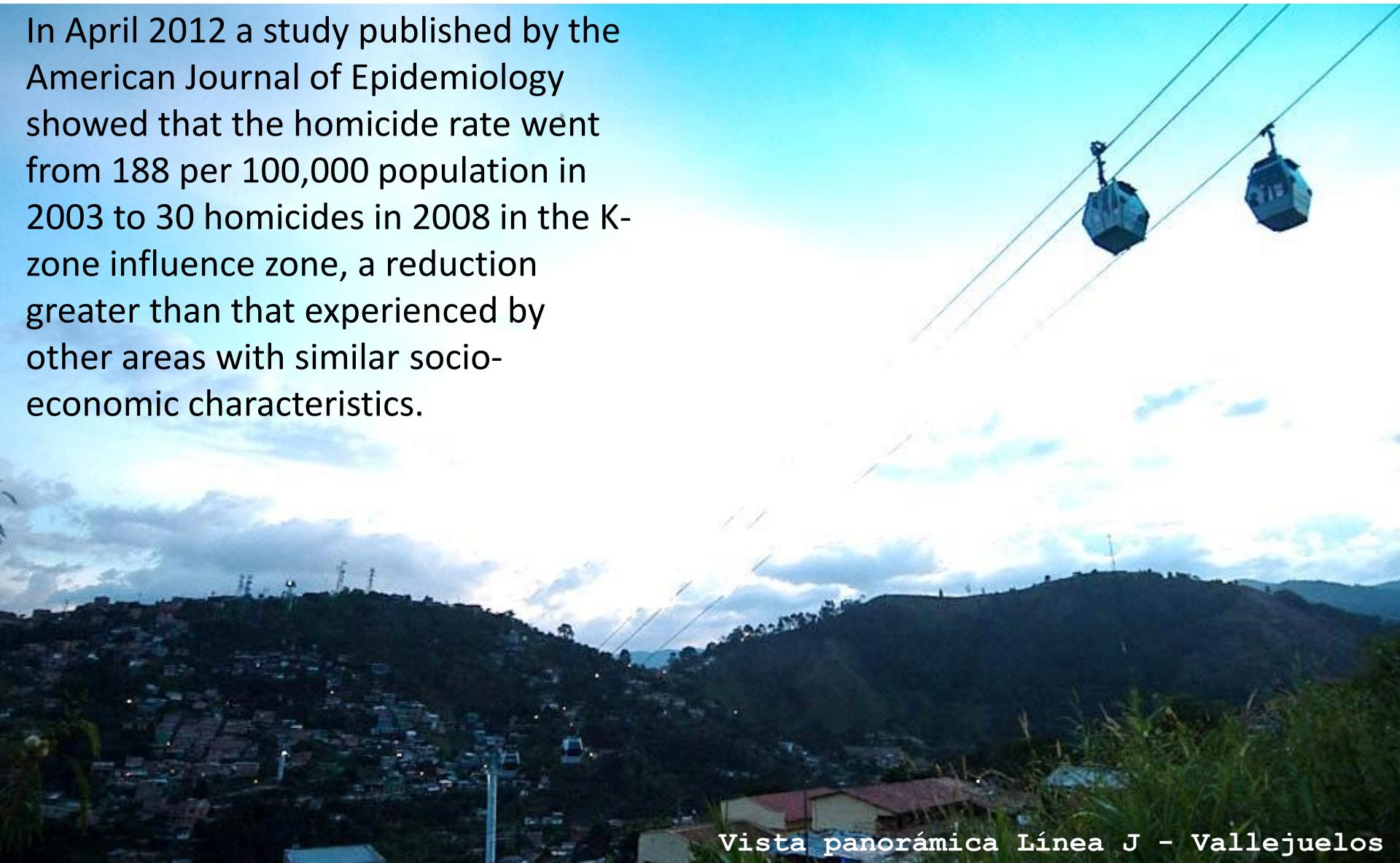
Distribución Modal Área Metropolitana.

Fuente: Urbam EAFIT con base en EOD. 2012.

### 3. Added value

# Urban transformation

In April 2012 a study published by the American Journal of Epidemiology showed that the homicide rate went from 188 per 100,000 population in 2003 to 30 homicides in 2008 in the K-zone influence zone, a reduction greater than that experienced by other areas with similar socio-economic characteristics.



Vista panorámica Línea J - Vallejuelos

# Responding to the needs of the population



Vista panorámica Línea J – La Aurora

# Promoting new territorial dynamics



Vista panorámica Línea J - La Aurora

# Management begins before construction

Santo Domingo Savio - Before



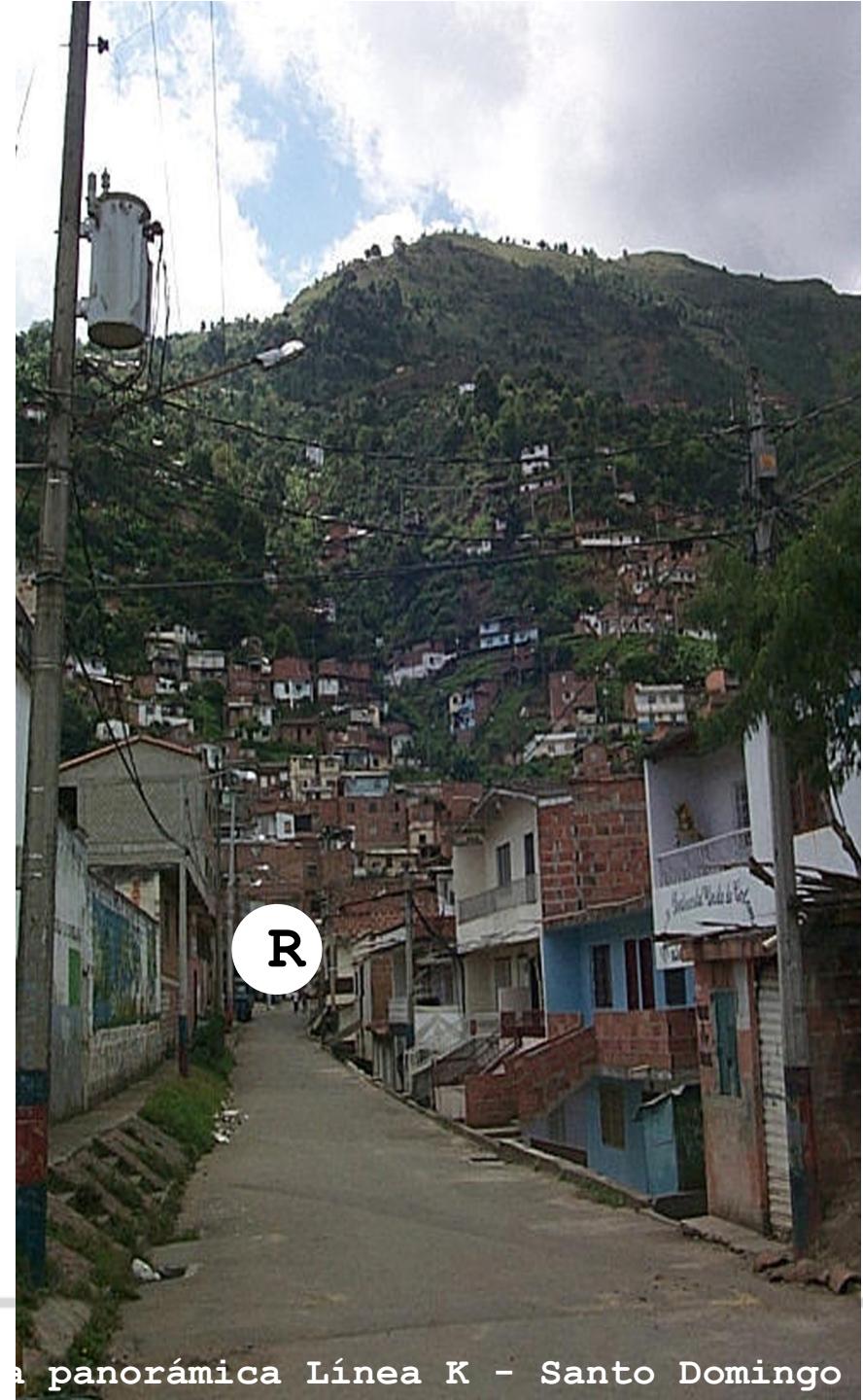
# ... and continues during the operation

Santo Domingo Savio - After



# Transforming territories

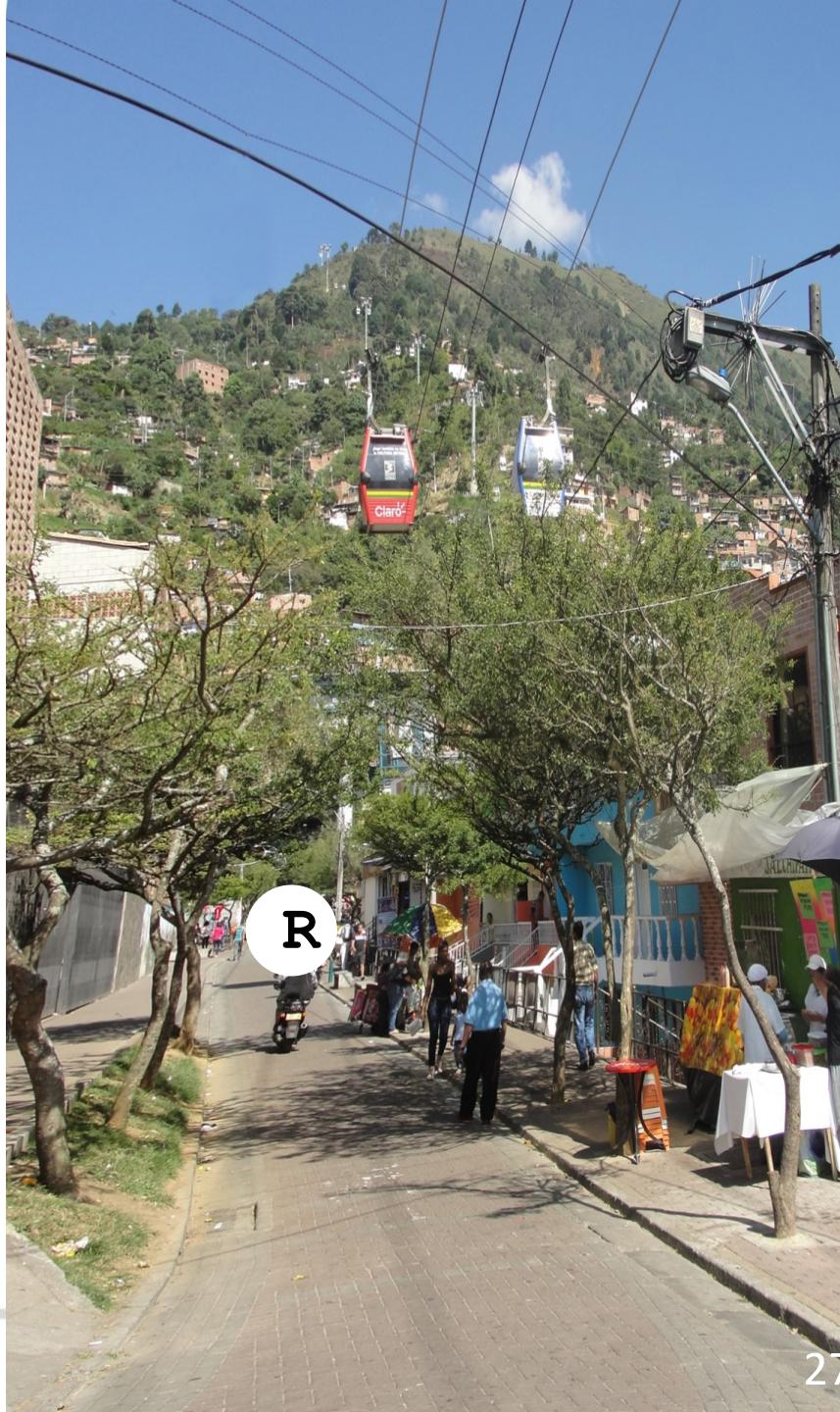
Santo Domingo Savio - Before



a panorámica Línea K - Santo Domingo

# Transforming territories

Santo Domingo Savio - After



# Transforming territories

Santo Domingo Savio - Before



# Transforming territories

Santo Domingo Savio - After



# Transforming territories

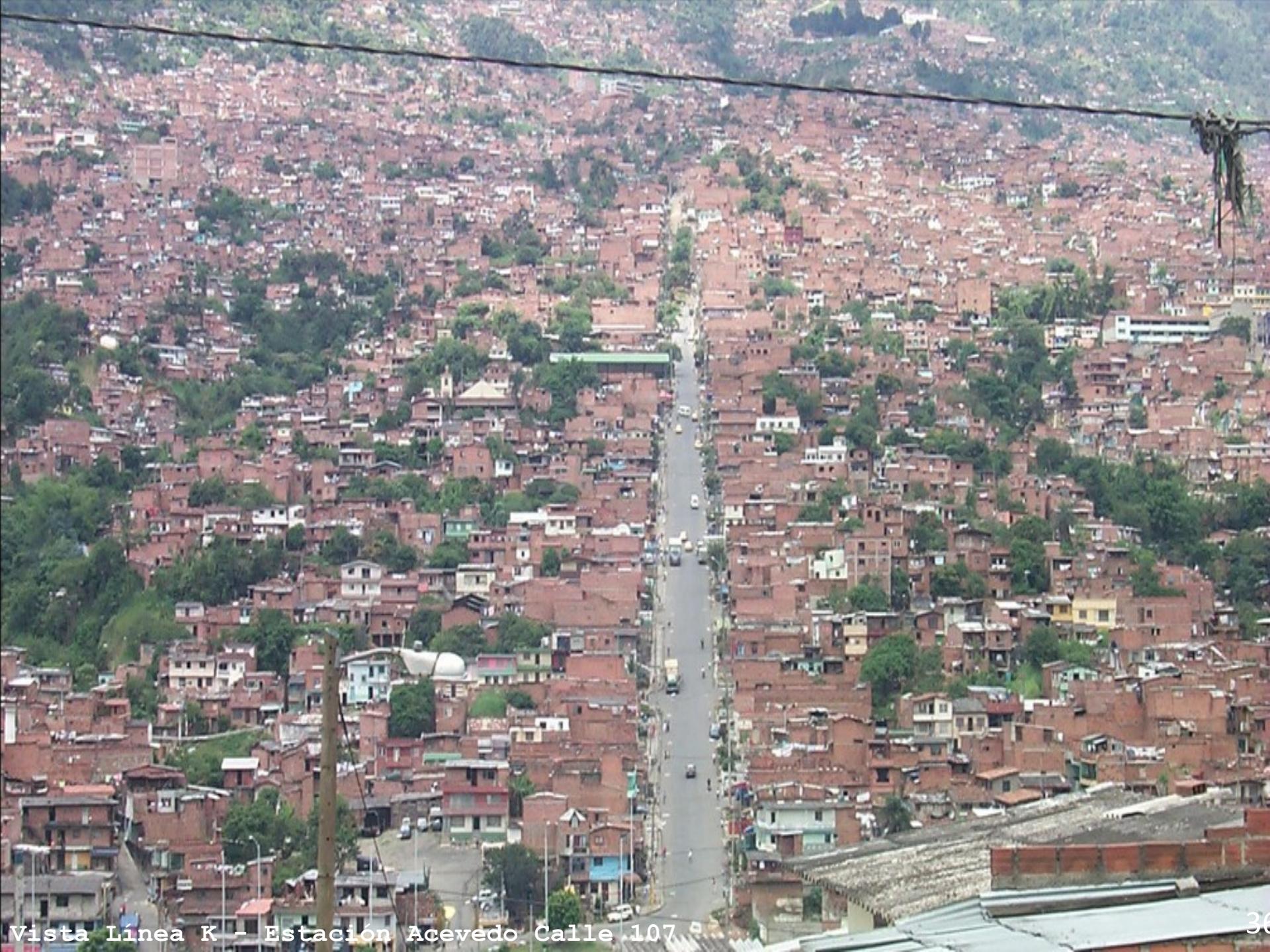
Santo Domingo Savio - Before



# Transforming territories

Santo Domingo Savio - After





Vista Línea K - Estación Acevedo Calle 107



# Low space requirement



Vista panorámica Línea K - Estación Popular

# No displacements



Vista panorámica Línea J - Estación Juan XXIII



# Externalities 2016



**Reducing CO2 emissions  
20.391 (Ton. CO2)**

**Reduction of atmospheric pollutants  
1.063 (Ton. Año)**

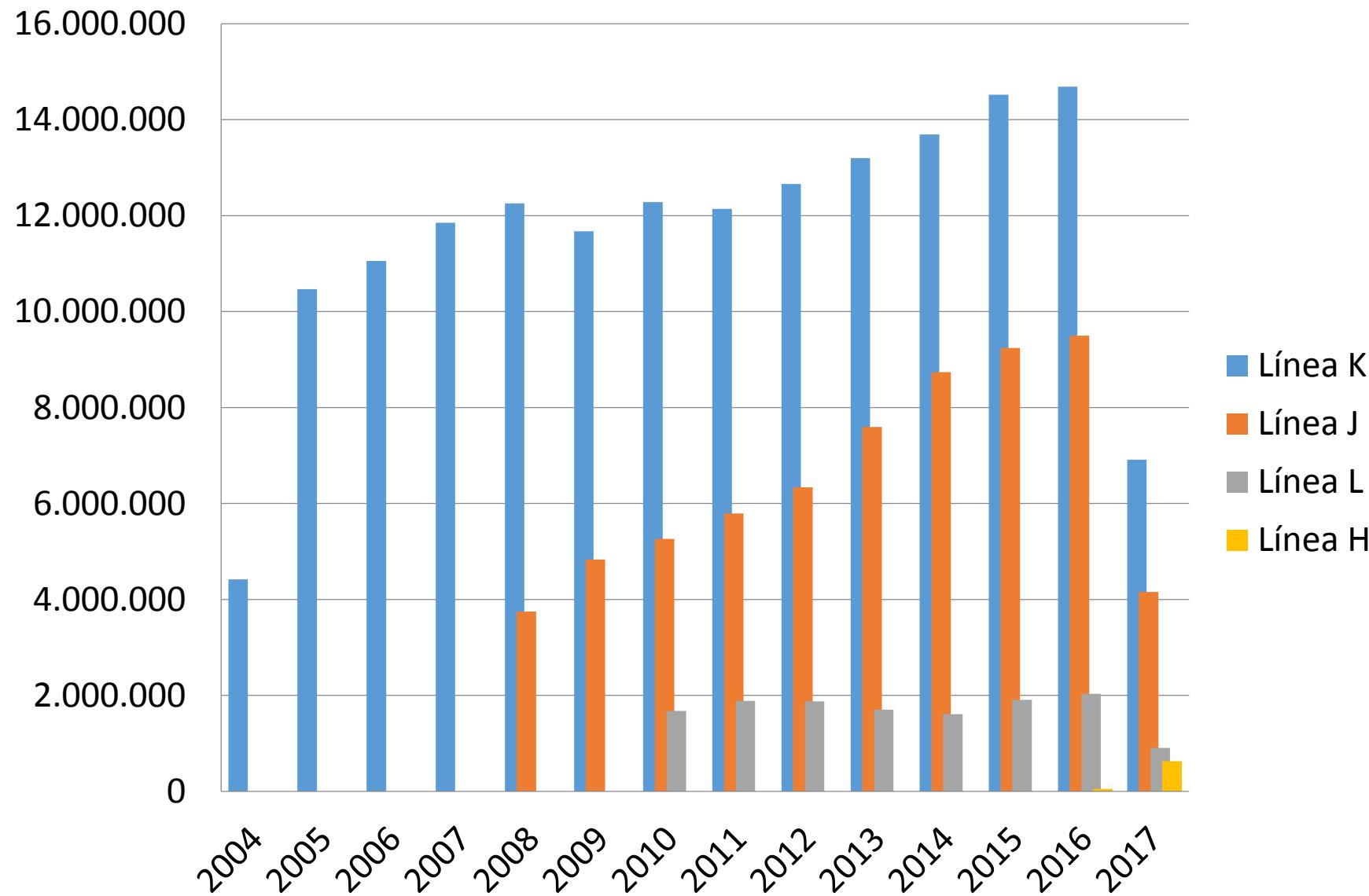
**Reduction of fossil fuels  
2.142.299 Gal.**

**Safe Mobility  
No accident involving people**

# 4. Operation and maintenance management

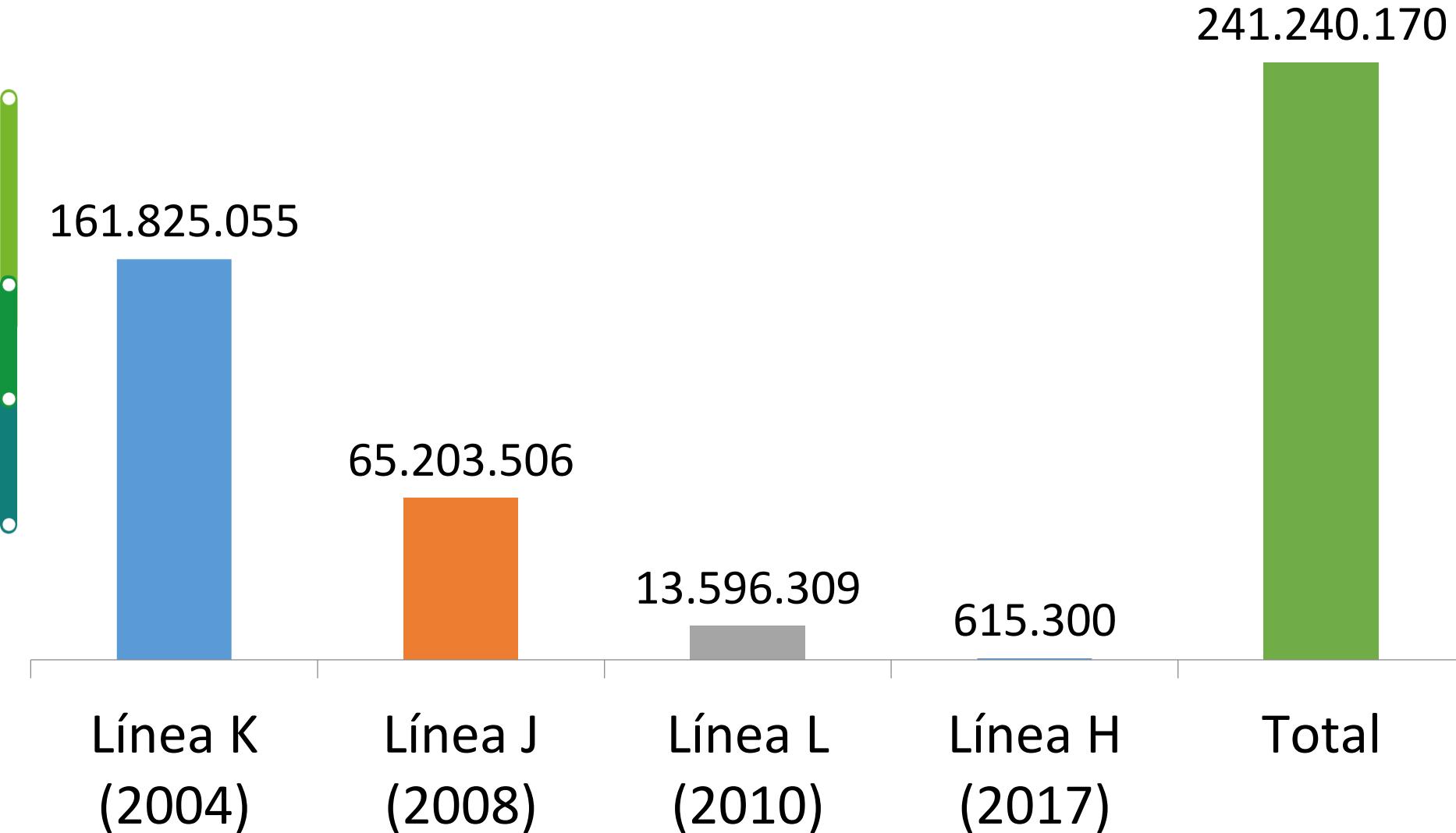


# Passengers



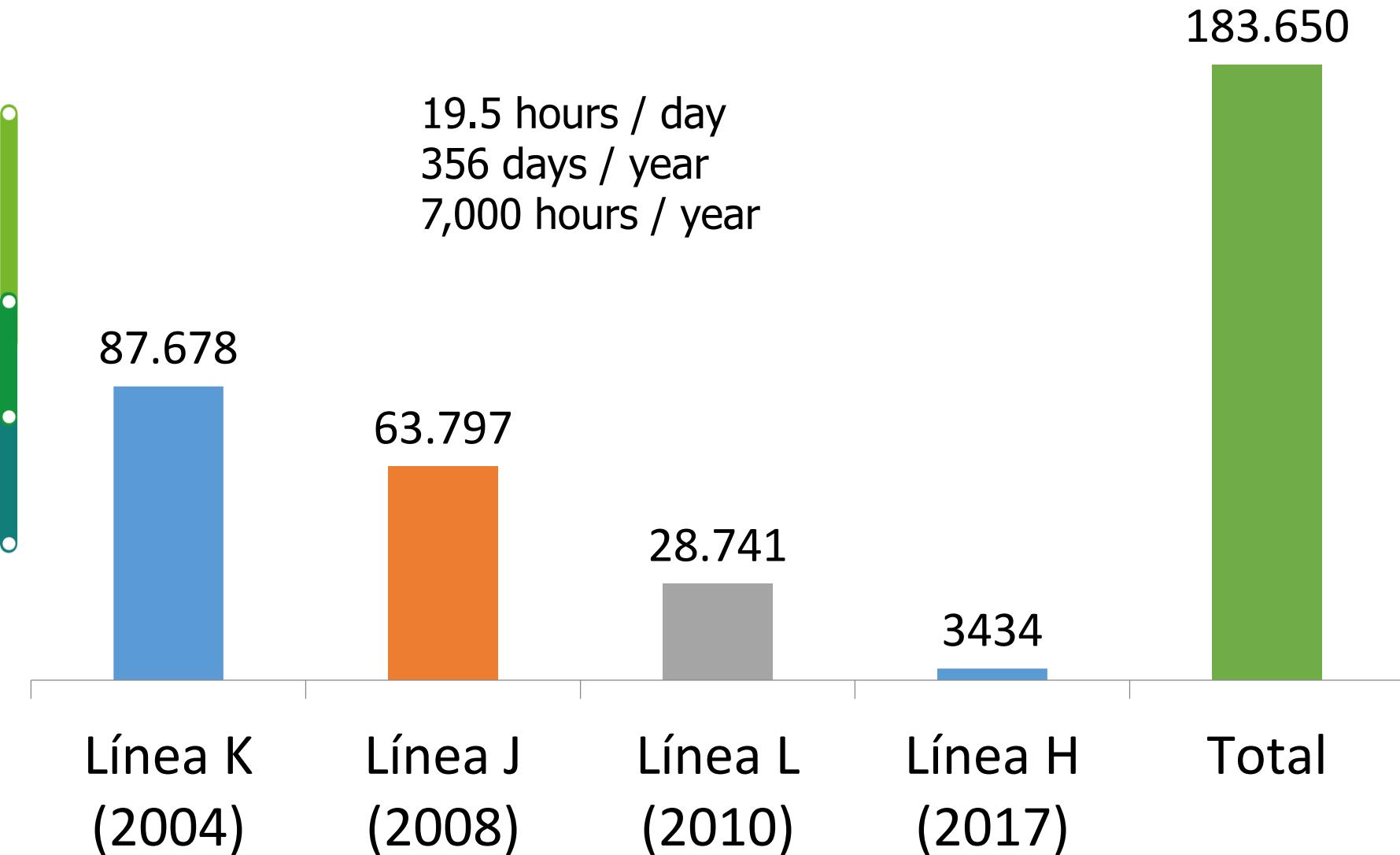


# Total passengers (2004-2017)





# Operation hours (2004-2017)





# Operational availability

	2012	2013	2014	2015	2016
LK	99,80%	99,90%	99,82%	99,81%	99,13%
LJ	99,77%	99,80%	99,93%	99,87%	99,09%

Caused by:

- Climatic conditions (atmospheric discharges): 73%
- Technical malfunctions: 14%
- Operational conditions (users, energy ...): 13%



# Safety - Security

## LEGISLATION

Norms, laws, agreements of law that act as mandatory means of regulation in order to have a positive impact on security level. Compliance with national or international standards.

## INFRASTRUCTURE SECURITY

Maintenance of systems  
Best maintenance practices  
Reliability models: RCM, AMFEC  
Responsible operation  
Investigation and development  
Surveillance

## EMERGENCY OPERATIONAL PLANS

Rescue by technical means  
Vertical evacuation of users  
Environmental management.

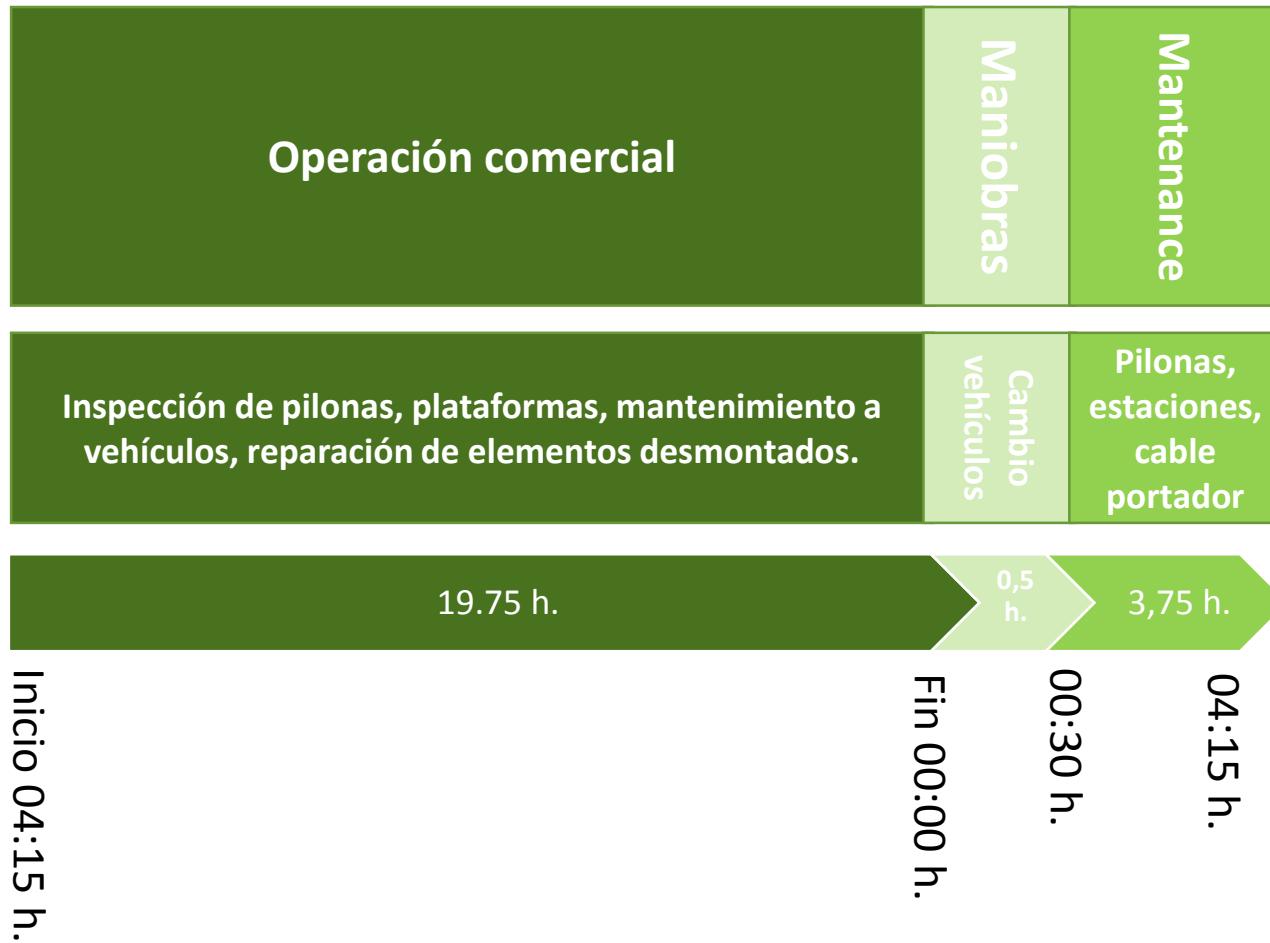
## RISK MANAGEMENT

Risk analysis  
Risk Inspections  
Business Continuity  
Insurance  
Self-insurance fund



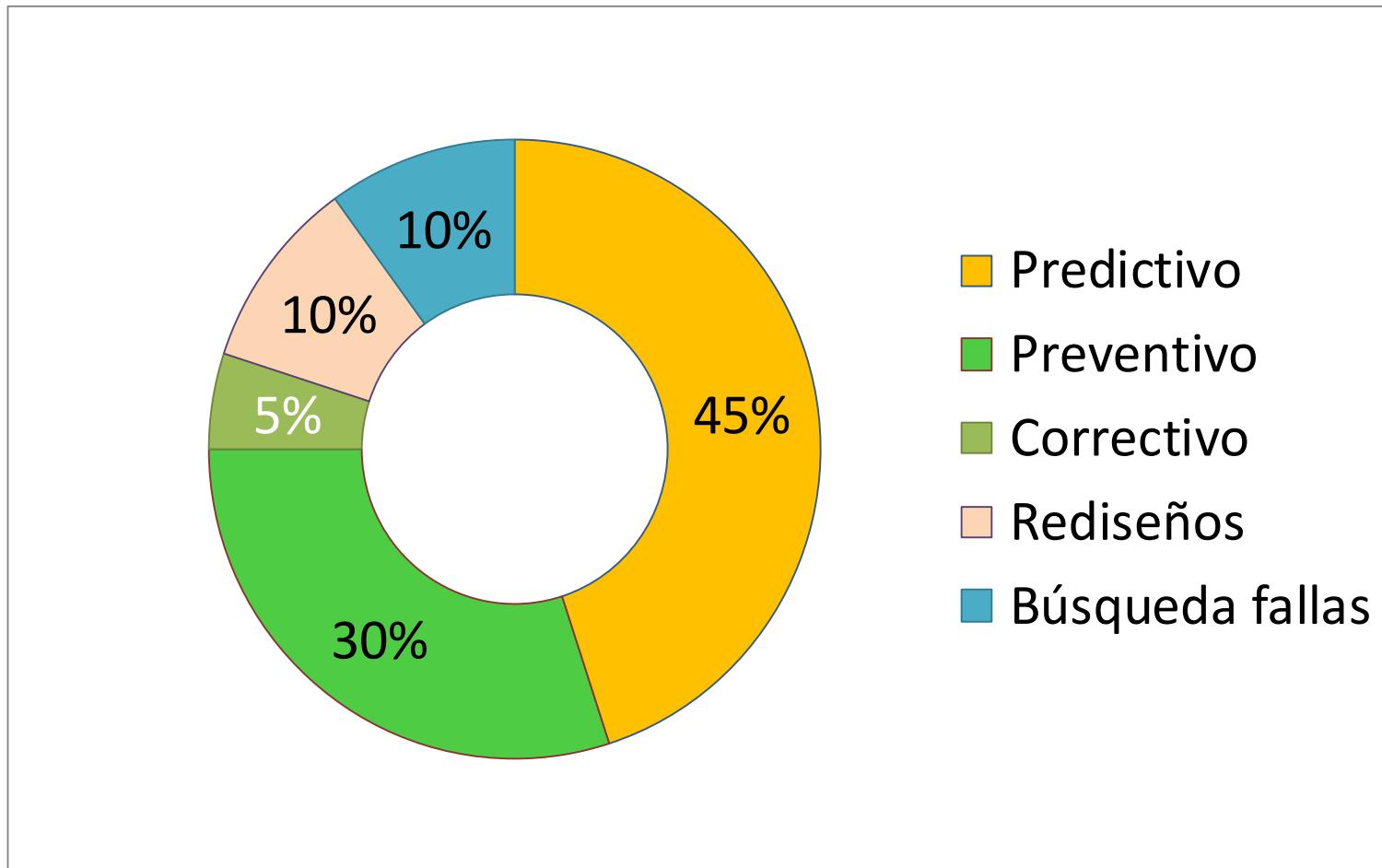
# Maintenance management

3.75 effective hours per night and 6 hours each weekend, for review and system maintenance:



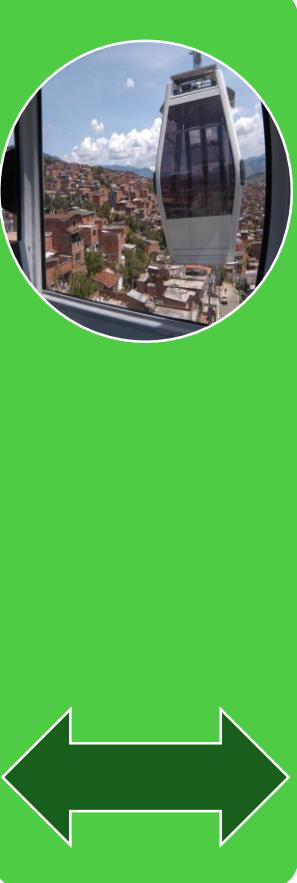
# Maintenance management

## Maintenance activities characterization:





# Maintenance management



**Before,**

**Interventions were made to know the equipment conditions.**

**Today,**

**Interventions are performed because the actual conditions of these equipment are known.**

# 5. Conclusions



# Conclusion

**Urban ropeway have proven to be a sustainable transport option in densely populated cities, meeting the needs of the region and its inhabitants, becoming transformers of the territory, improving life quality of thousands of people who enjoy their direct benefits through their everyday use.**

**It will be essential to maintain high standards of reliability and safety in order to ensure that urban ropeways continue to be an efficient transport solution. Stakeholders, manufacturers, authorities and operators, need to dedicate their research, development and innovation efforts to achieve sustainable systems.**



# Thank you



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