



Tehran Metro Network

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Iranian cities with metro

Area (km2)	1,648,195
Population (Millions)	80
Number of Most Populated Cities (over 1 million)	9

City	Length (km)	Lines
Tehran	559	12
Mashhad	119	5
Esfahan	112	4
Karaj	105	6
Ahvaz	88	4
Shiraz	73	5
Tabriz	63	4
Qom	52	3
Kermanshah	13	1
Total	1184	44



Global mass rail transit network - Present

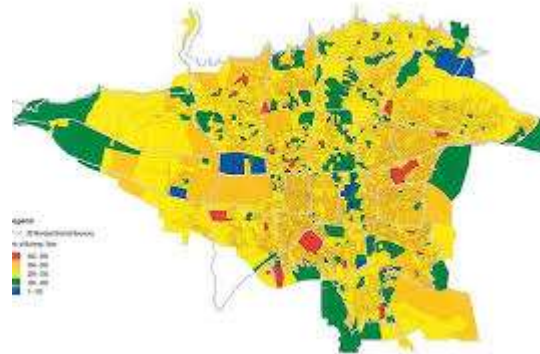
Cities with operational metros	157
Daily ridership (million)	+160
Average daily metro patronage (million)	+1.0

In Iran

Cities with operational metros	5
Cities with metros under construction	4
Average daily metro patronage (million) - Tehran	3

Tehran at a glance

- ❖ Capital of Iran
- ❖ Population: 8,300,000
- ❖ Surrounded by satellite cities and towns (total population 15.0 Million)
- ❖ Area: 800 Km²
- ❖ Population density: 10750/km²
- ❖ Residents trip: 17.0 M/day
- ❖ No. of cars: 4,000,000
- ❖ Subway: +300 km (8 lines)
- ❖ No. of buses: 8,000 (346 routes)
- ❖ No. of taxis: 80,000



Major challenges

- Tehran is surrounded by mountains, therefore natural ventilation and air flow is blocked
- “Air Inversion” in cold seasons postpones air circulation and as a result the polluted air stays in the lower layers of the air



- Private car attractiveness is still high, although many restrictive initiatives have been taken (implementation of congestion charging system for main CBD, odd-even restricted areas, elimination of fuel subsidies)

Tehran transportation system and environmental concerns

More than 4 million vehicles account for 88 percent of air pollutants produced in Tehran

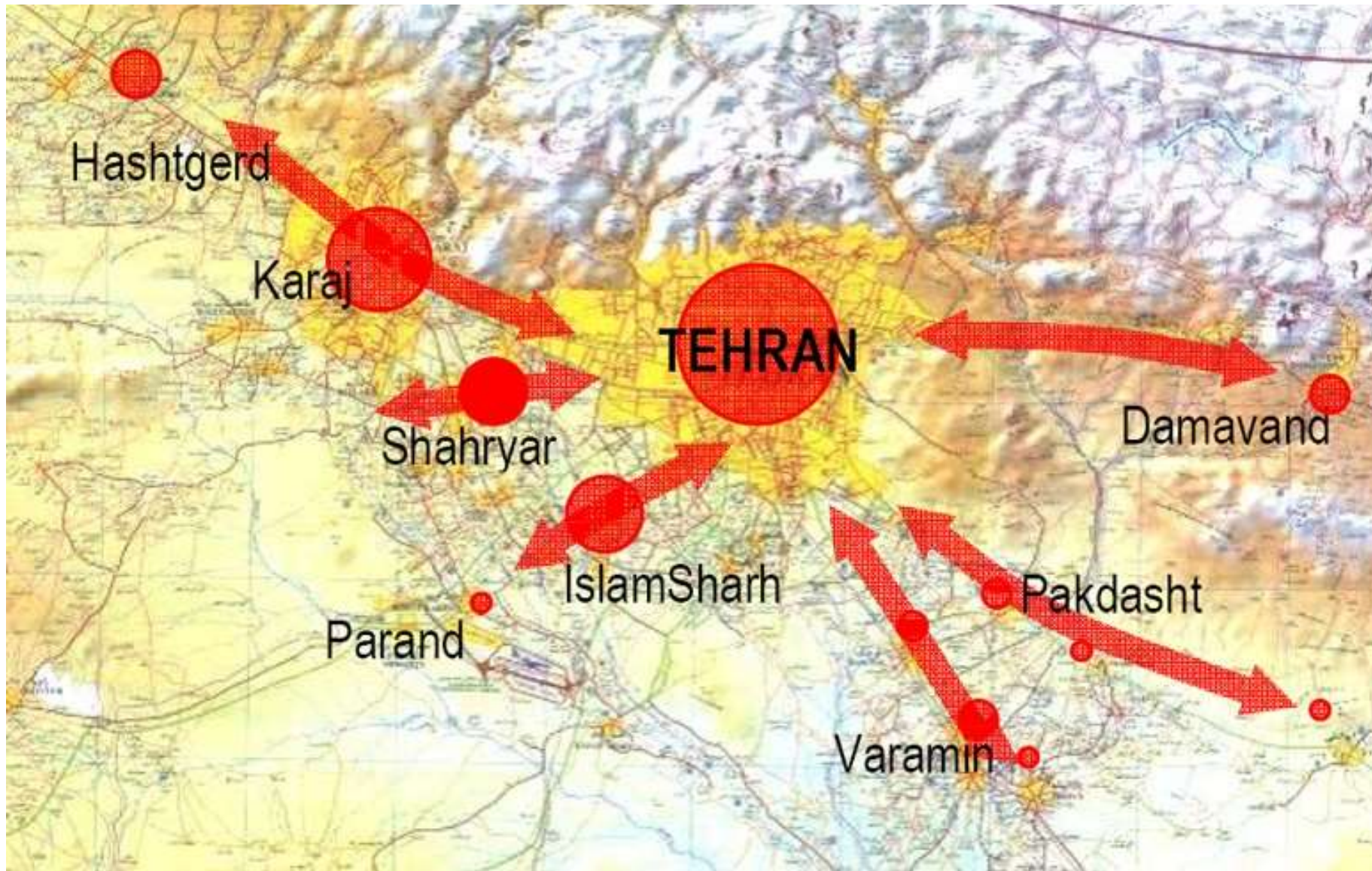
+1200 tons of air pollutants are disseminated in Tehran especially Sox, Nox, Co and also suspended particulates

Every private car consumes 9 times more energy than a public bus per passenger trip

Motorcycles are responsible for almost 50 percent of noise pollution in Tehran

Average speed of public buses is just about 14 km/hr

Greater Tehran polycentric organization - Present



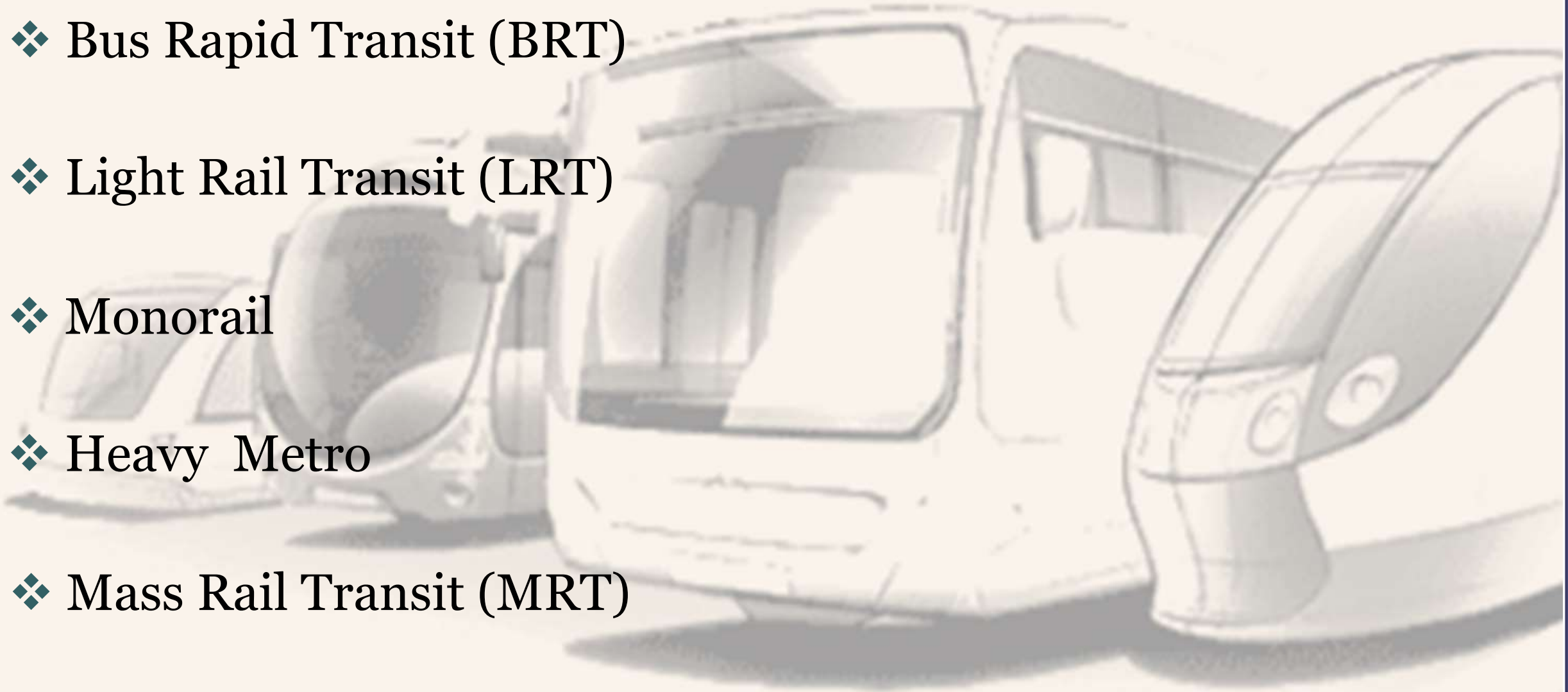
City vision

In **2025**,
Tehran should have **Integrated**,
Available, Safe, Easy, Comfortable and Clean
transportation system considering resource
limitations and other conditions for life
improvement quality.



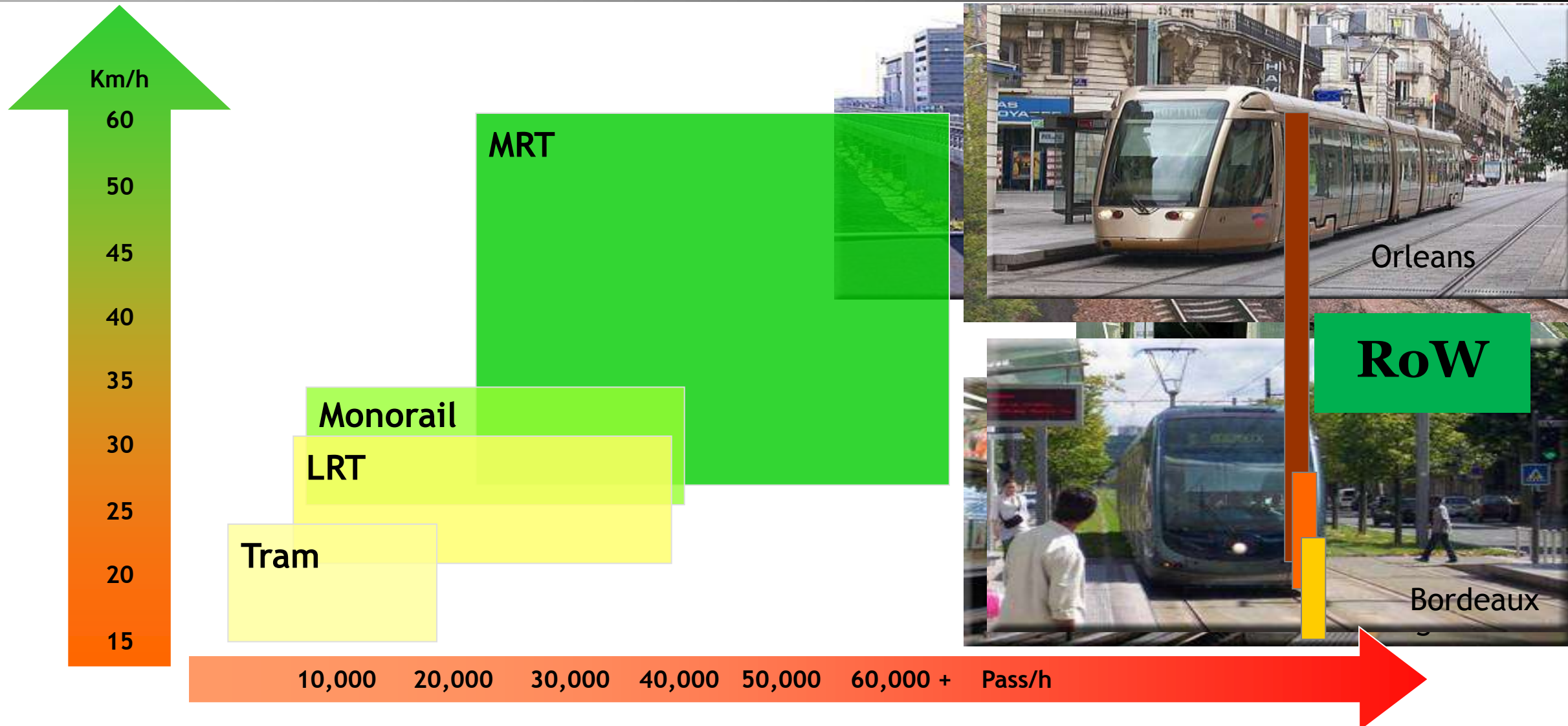
Different modes of public transportation systems

- ❖ Bus Rapid Transit (BRT)
- ❖ Light Rail Transit (LRT)
- ❖ Monorail
- ❖ Heavy Metro
- ❖ Mass Rail Transit (MRT)



Concepts and principles of design

Concept of rail system hierarchy



Attributes of public transportation systems

Qualitative criteria Systems	Commercial speed (km/h)	Service reliability	Space occupation	Air pollution	Noise in street	Energy consumption	City network coverage	Image	Construction costs
Bus	10-20	☹	😊😊	☹	😊	☹	😊😊😊	☹☹	😊😊😊
BRT	15-25	😊	☹	☹☹	☹	😊	😊😊	😊	😊
LRT	18-35	😊😊	😊	😊😊😊	😊😊	😊😊	😊	😊😊😊	☹
Metro	30-45	😊😊😊	😊😊😊	😊😊😊	😊😊😊	😊😊😊	☹	😊😊	☹☹

Tehran long term urban rail plan at a glance - First version

❖ 4 Express lines 192 km

❖ 8 Urban lines 367 km

Total length: 559 km

❖ 5 Complementary tram lines, 60 km

❖ 13 Main interchange stations

❖ 54 Transfer stations

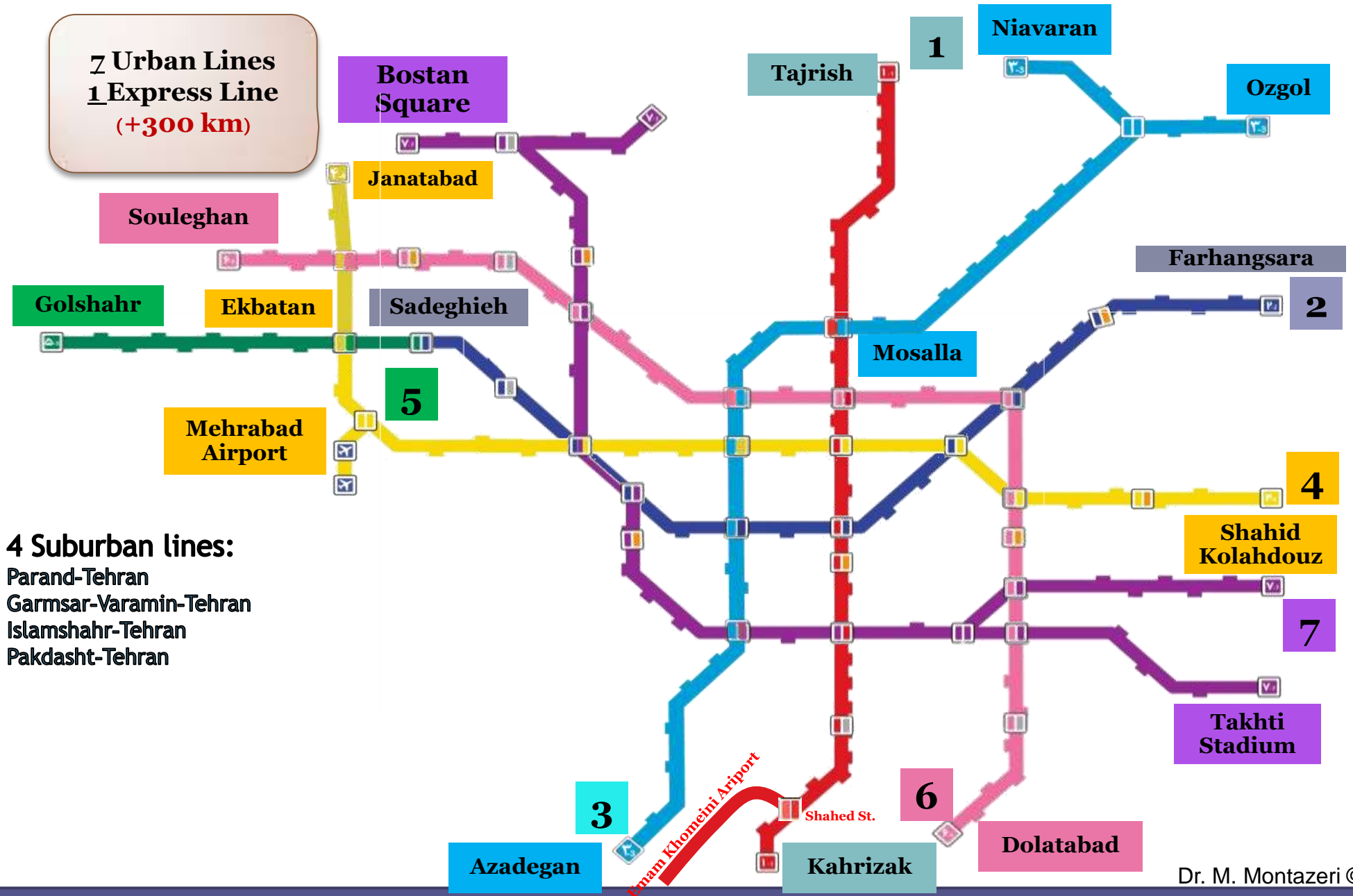
❖ 19 Park & Ride facilities

❖ 10 Public transport hubs in connection with bus, railways or airport services

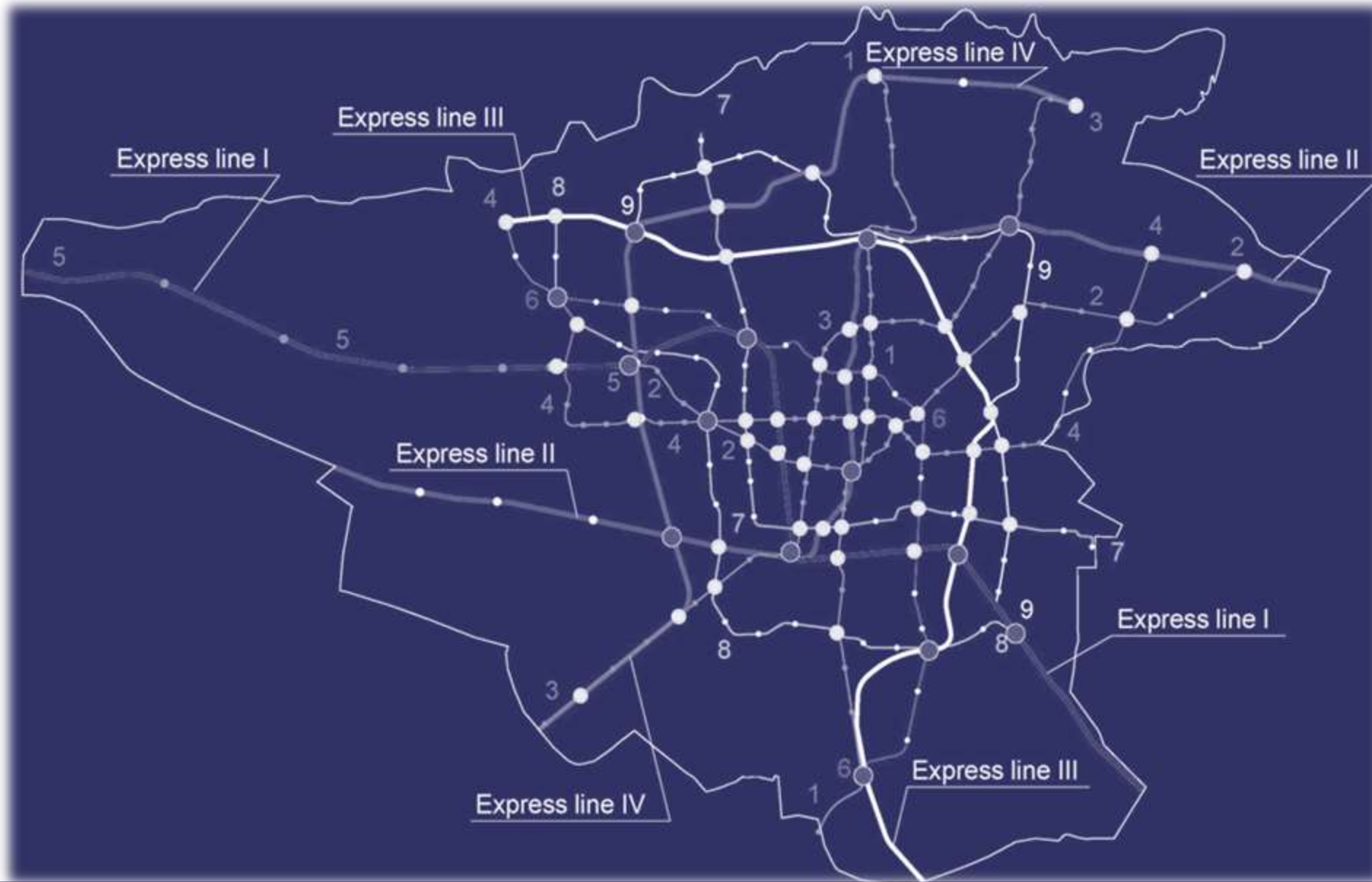
❖ 10 million planned daily trips



Tehran Metro Map

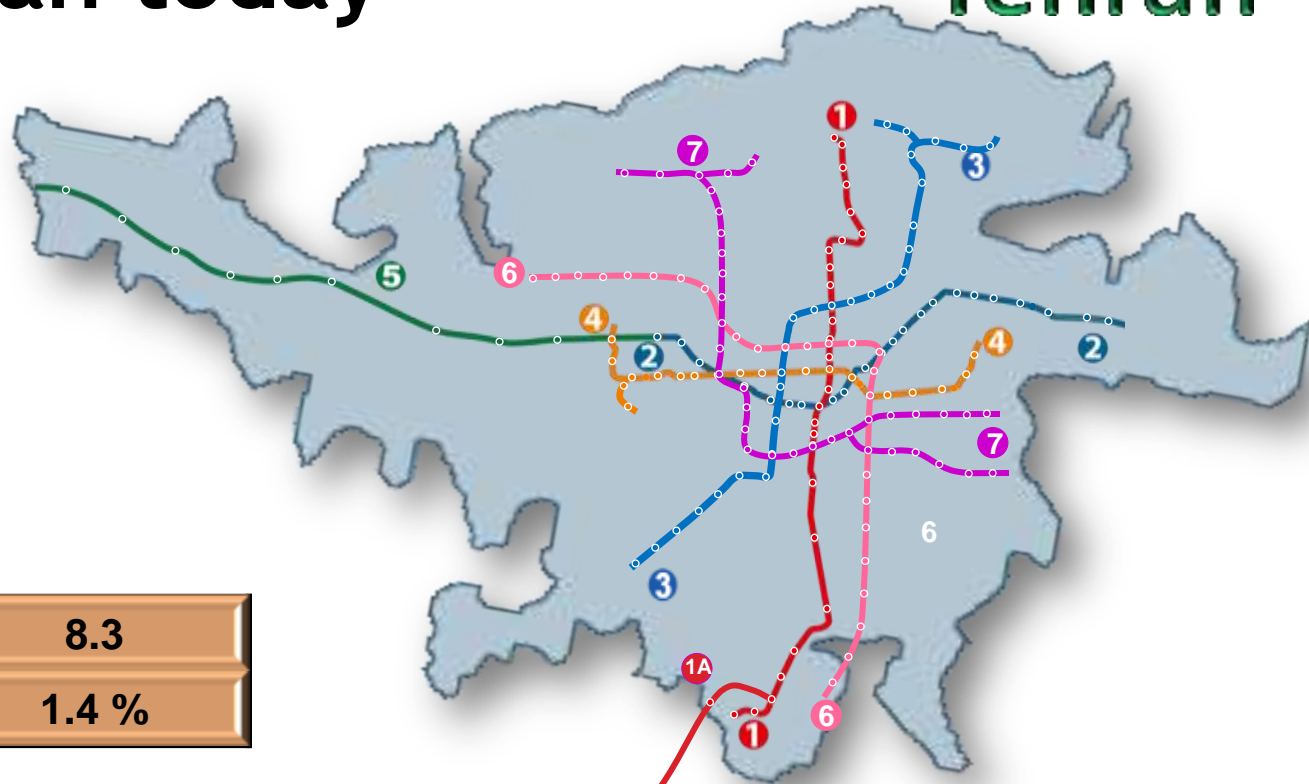


Express lines



An outlook on Tehran today

Tehran

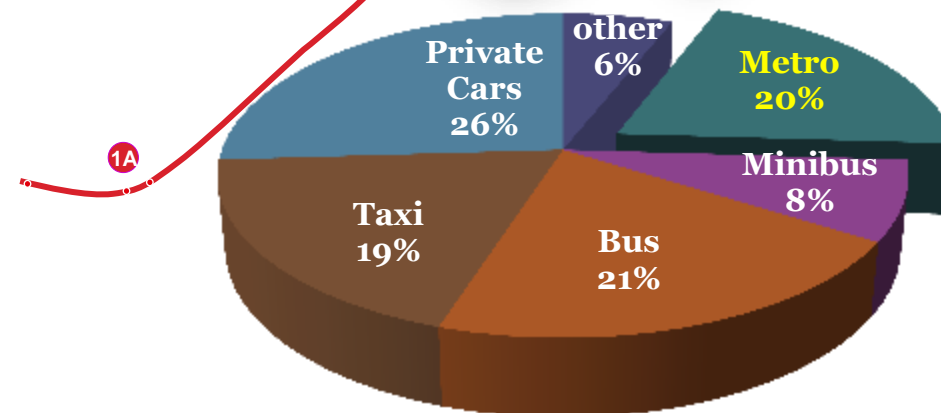


Area	800 km ²
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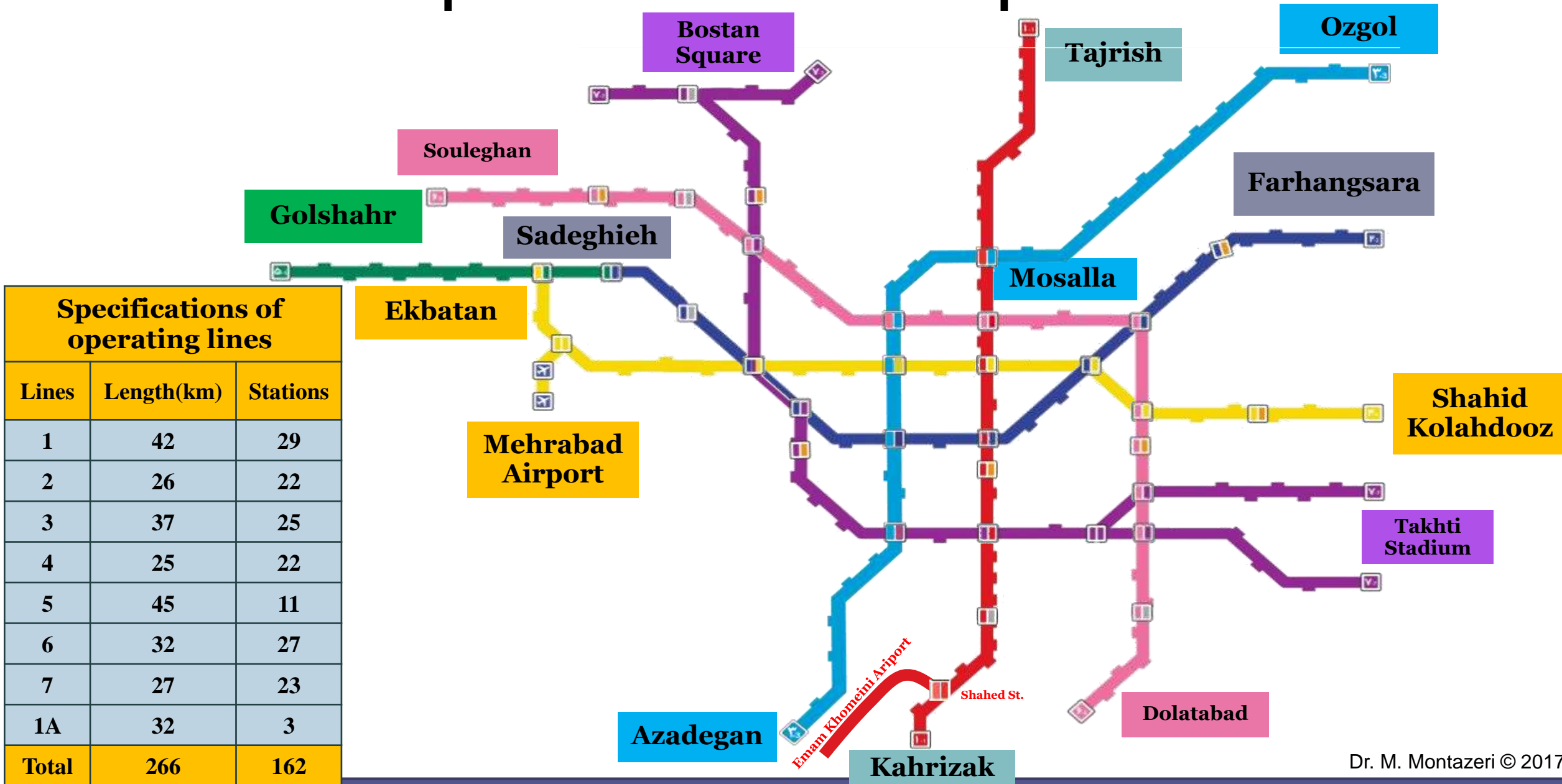
Population (million)	8.3
Growth	1.4 %

Daily Journey	17,000,000
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Year	Metro capacity
2010	15%
2017	20%

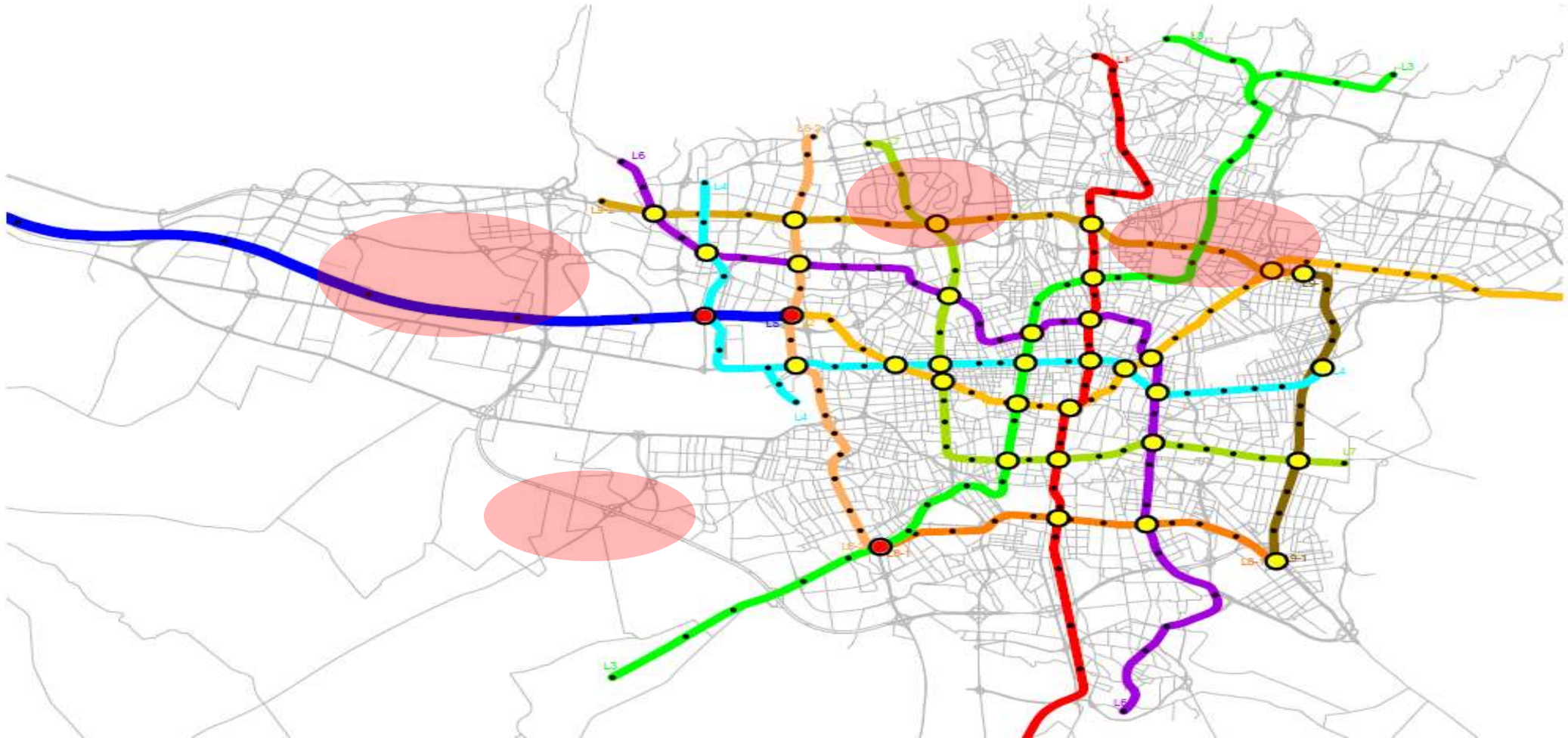


Tehran metro operational lines - September 2017



The necessity of revision in Tehran traffic and transportation comprehensive plan

To provide maximum access in areas without coverage

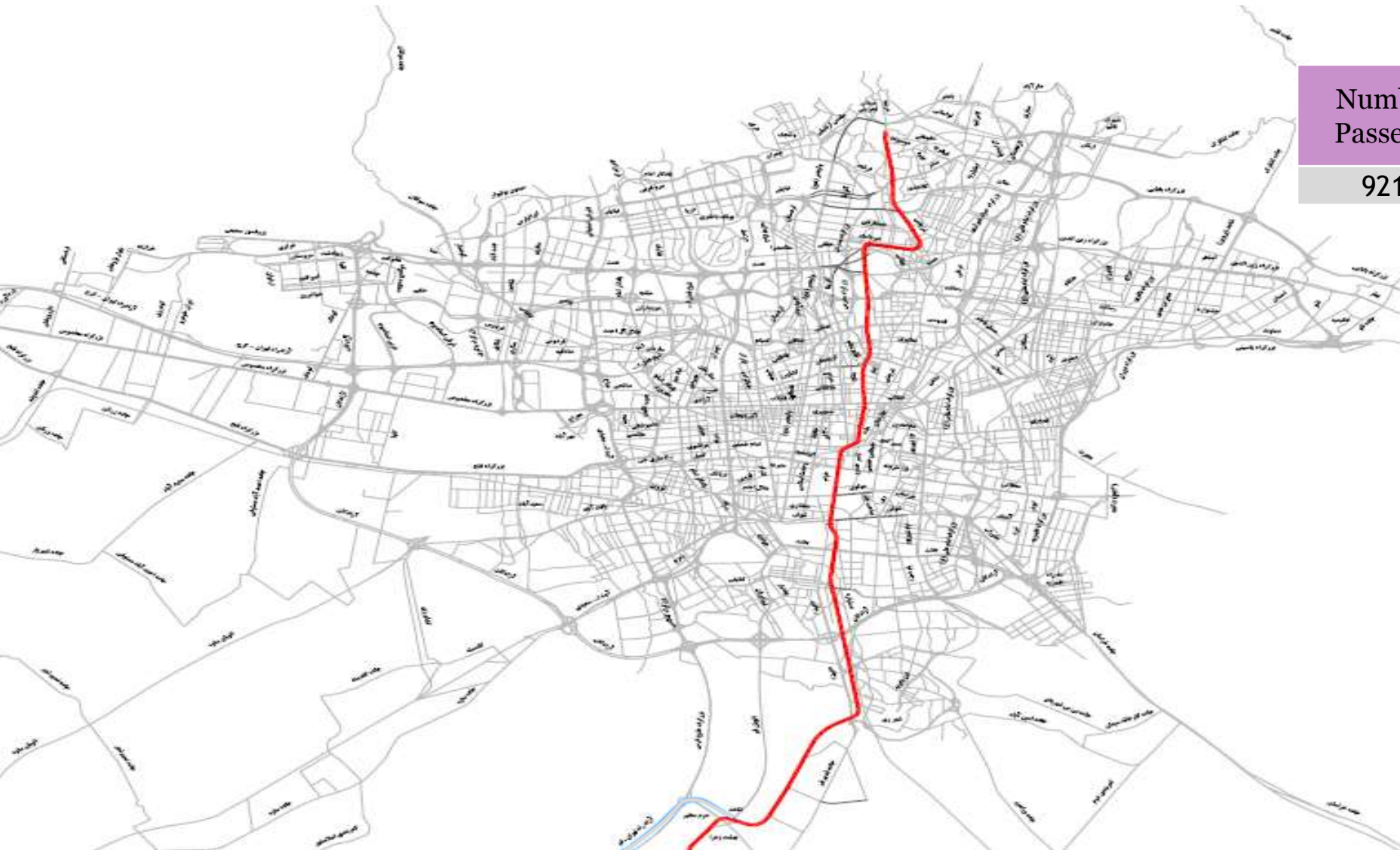


Introduction of superior network

The coverage of Tehran railway network equals 56.7 percent of the city area

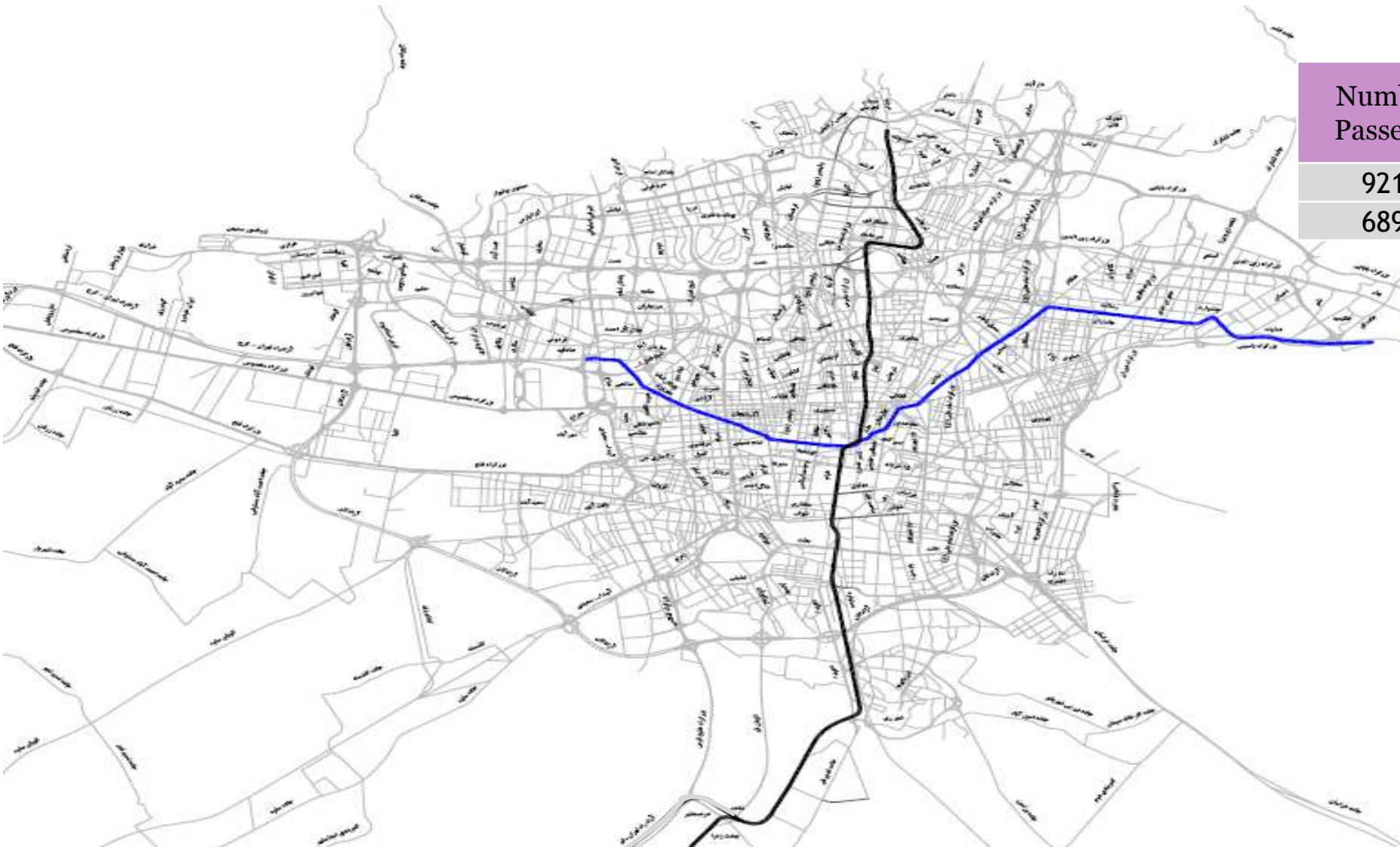


Lines and the network coverage



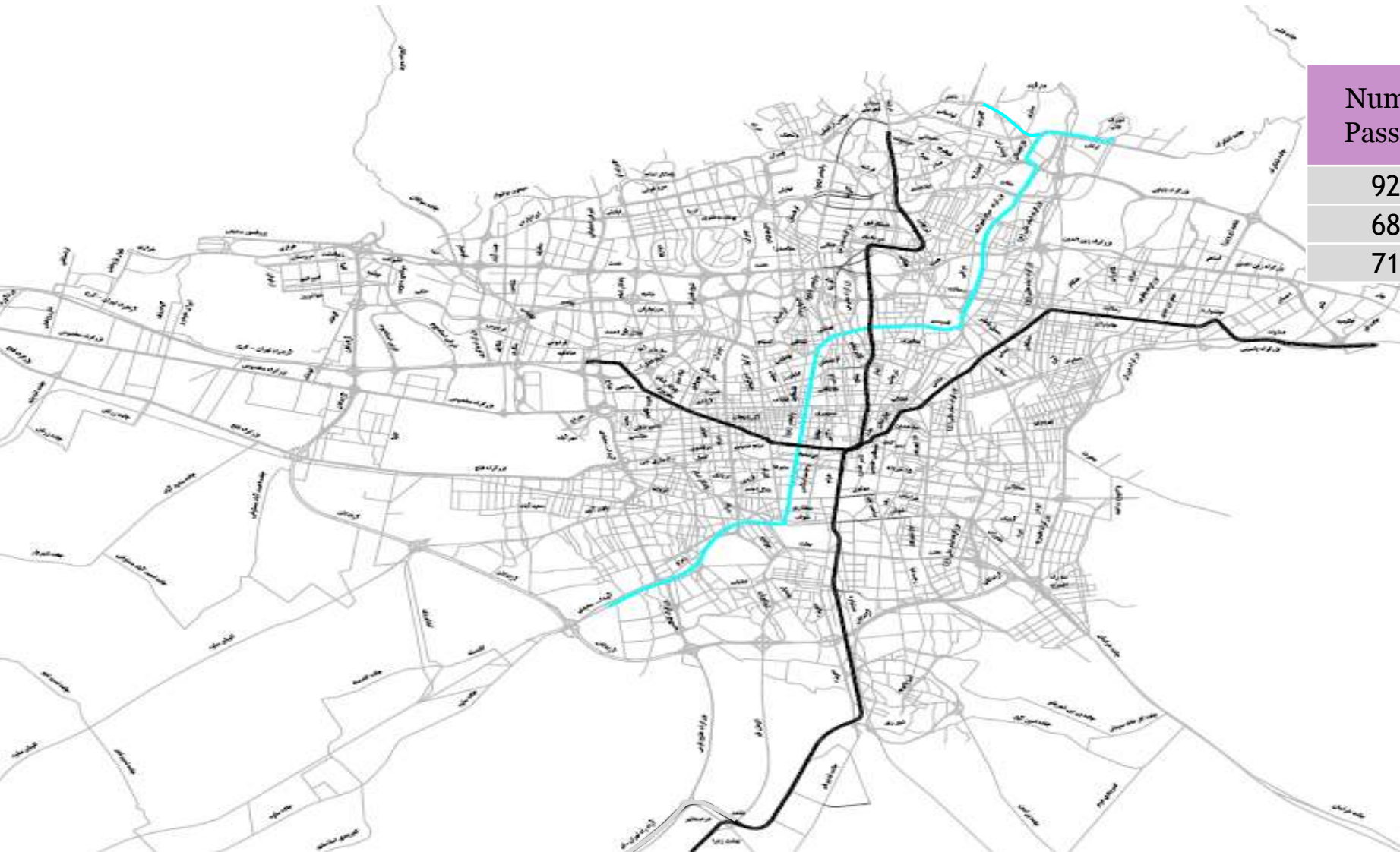
Number of Passengers	Number of Stations	Length (km)	Line
921954	29	42	1

Lines and the network coverage



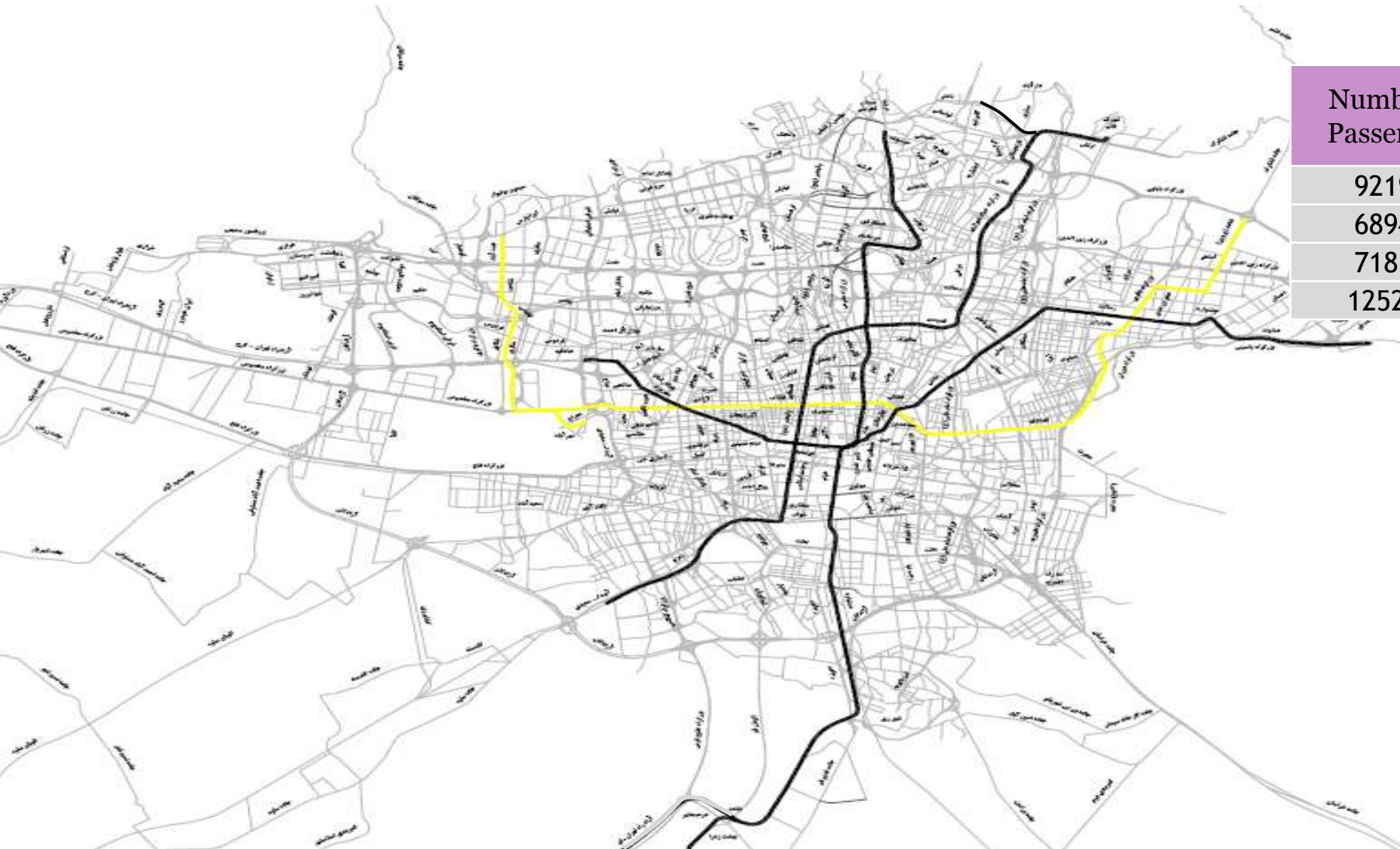
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Lines and the network coverage



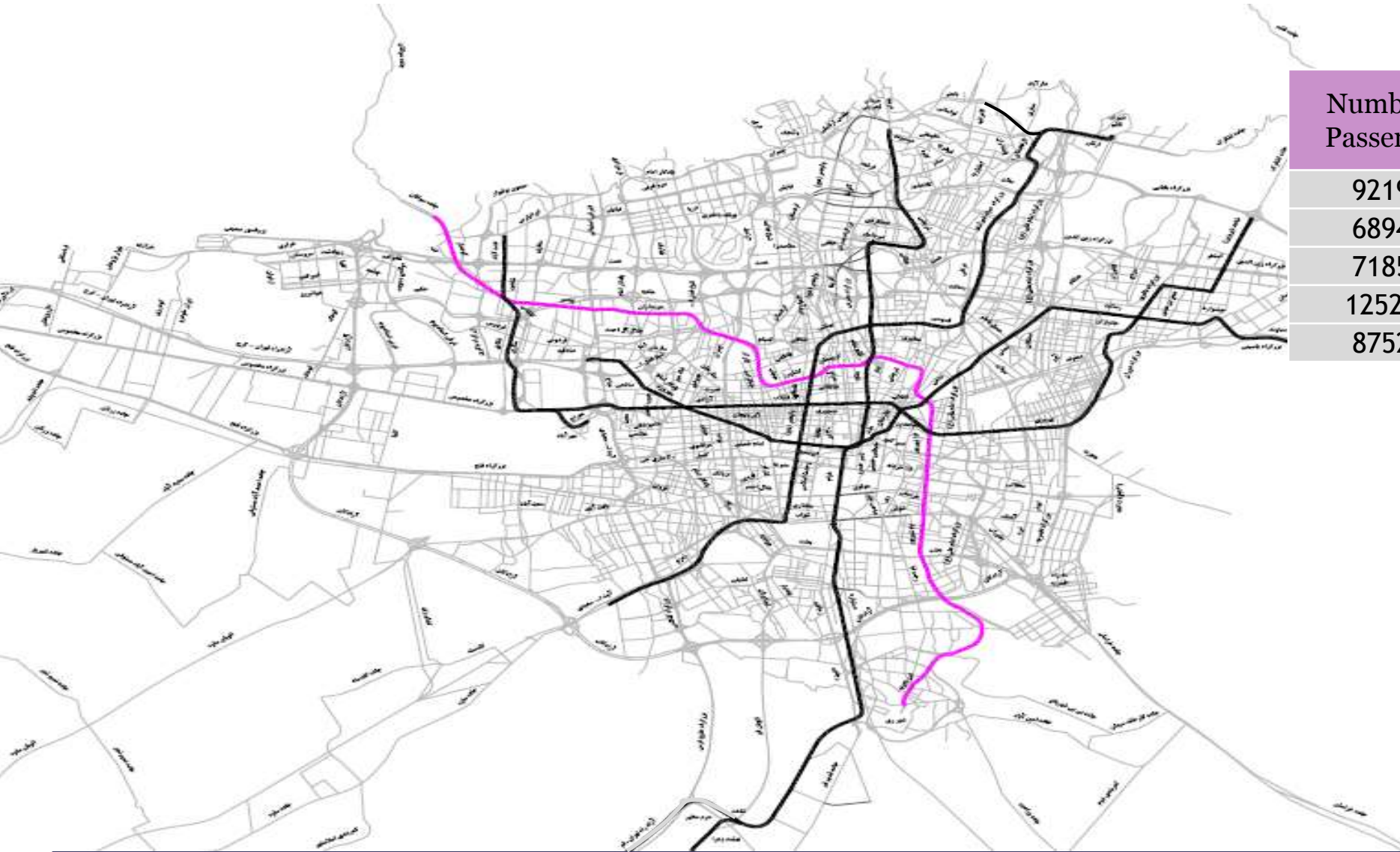
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Lines and the network coverage



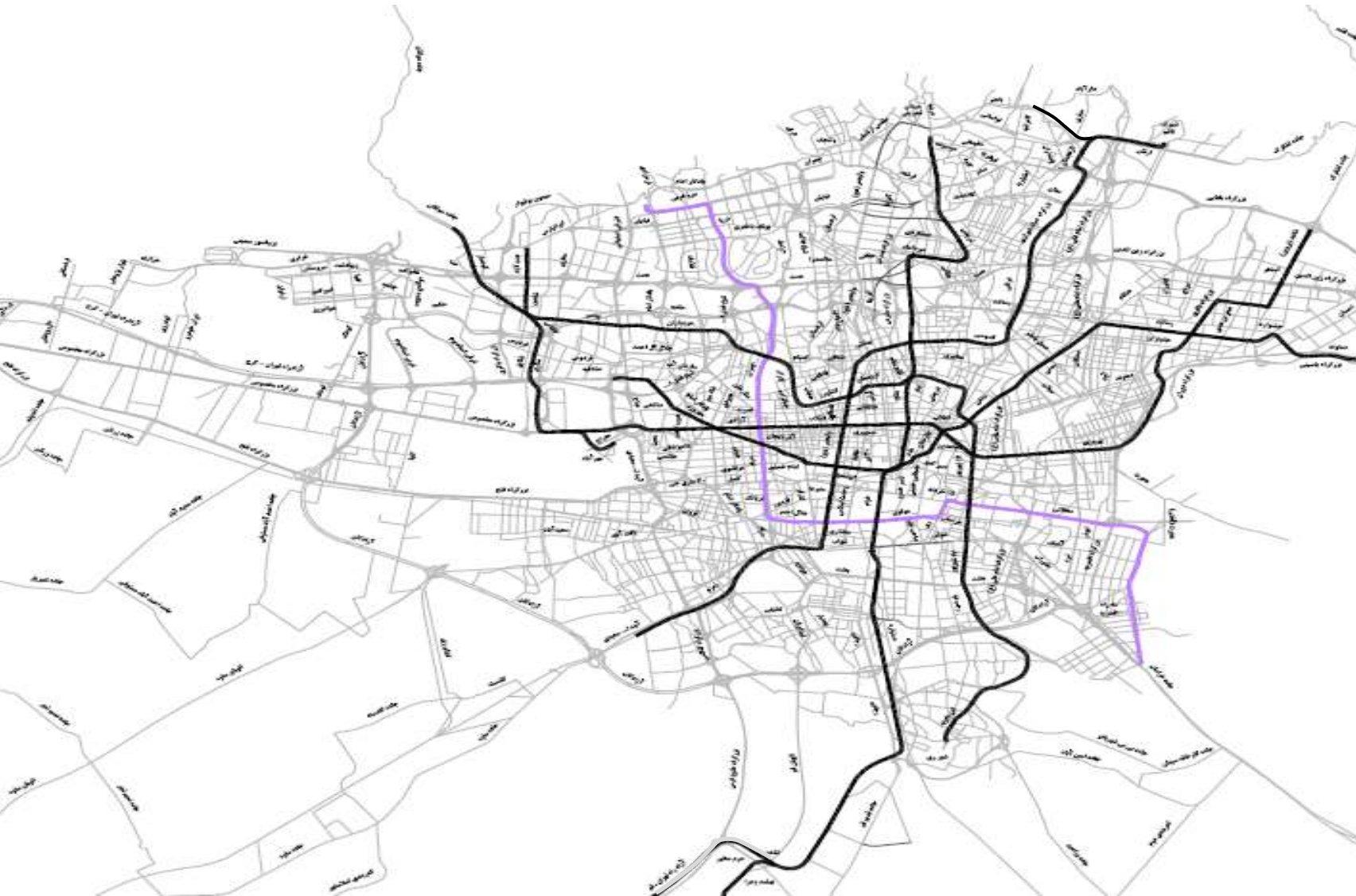
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Lines and the network coverage (proposed)



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Lines and the network coverage (proposed)



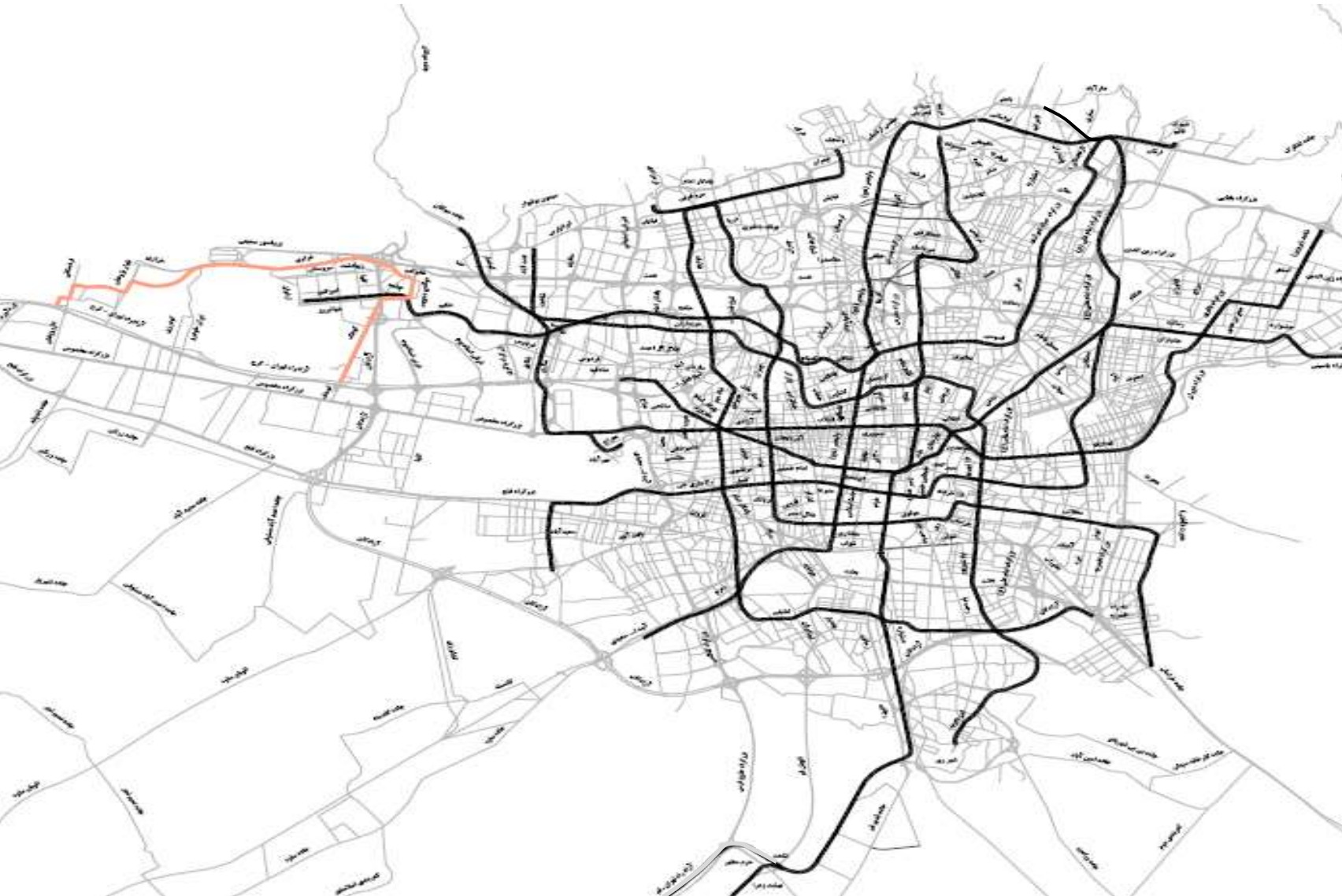
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611486	25	39	10

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NOTE: The length and the number of the stations in express lines are for urban districts

Lines and the network coverage (proposed)



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140000	4	52	1A

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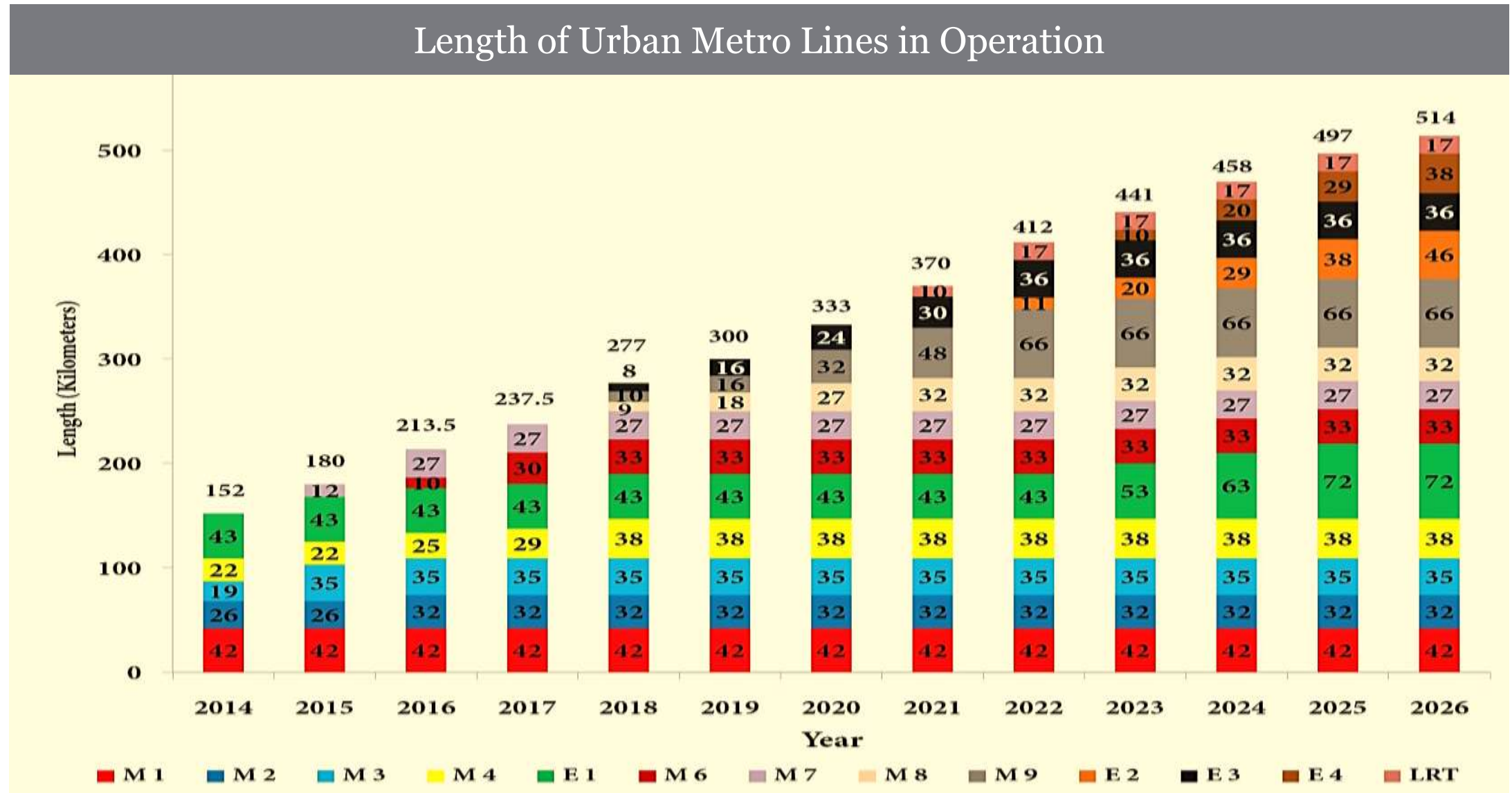
Lines and the network coverage (proposed)



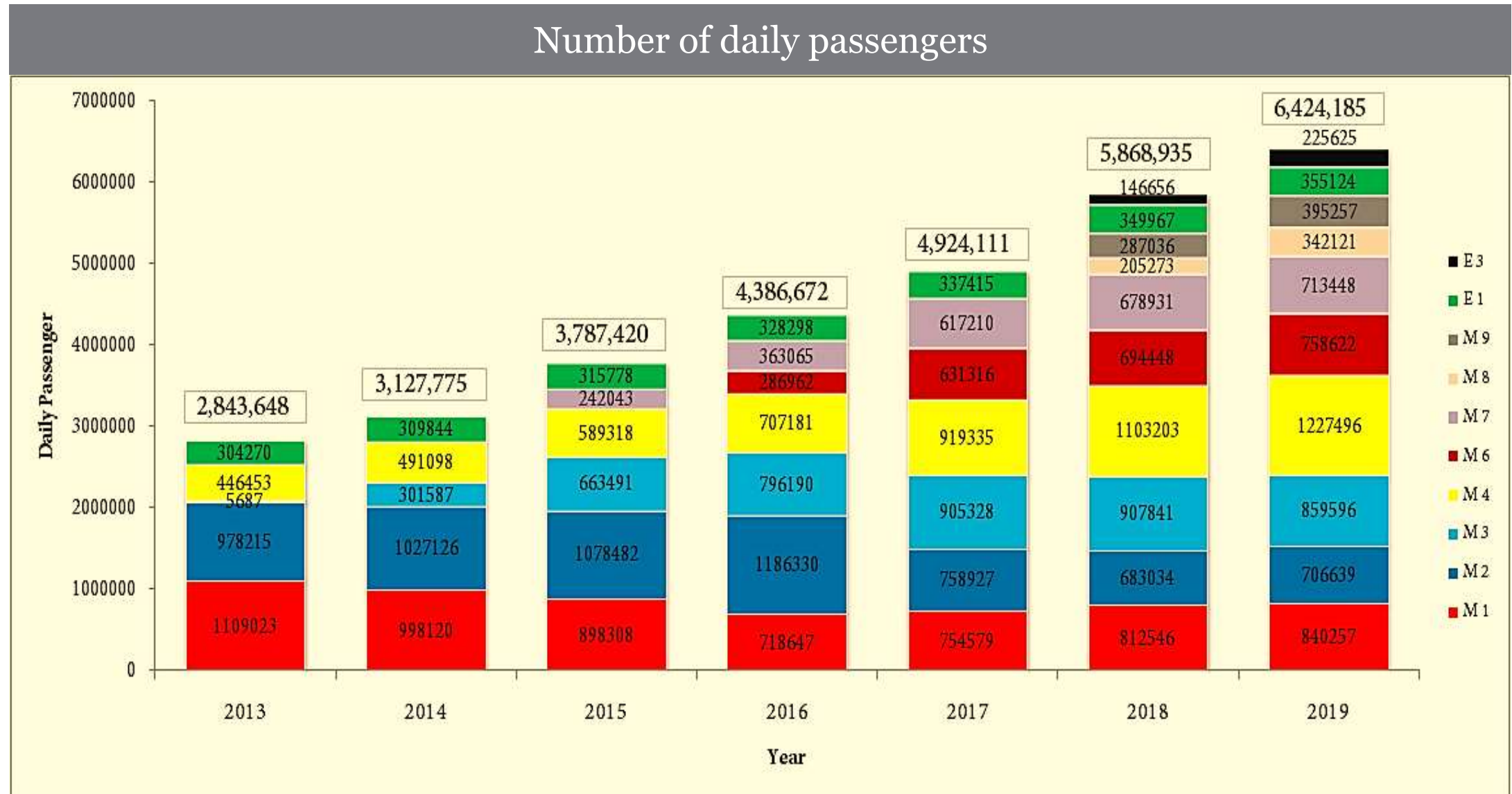
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541551	16	38	E 4
140000	4	52	1A
300000	5	15	Esl.
9359801	357	587	SUM

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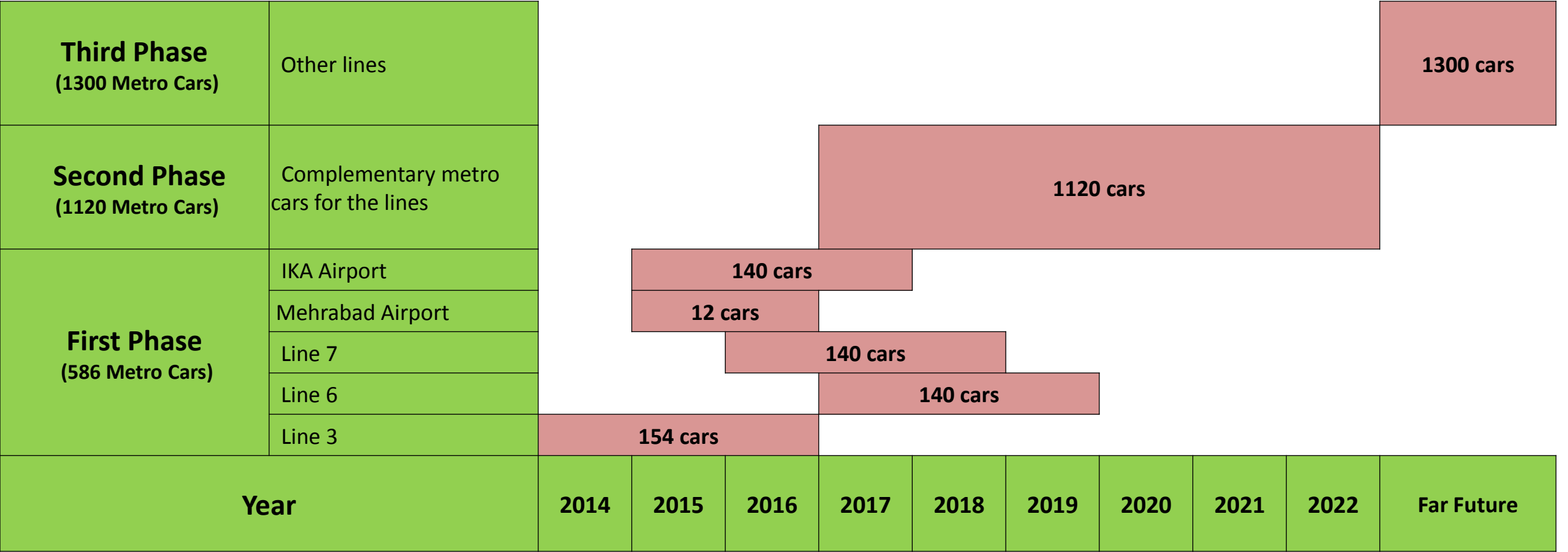
Lines and the network coverage



Lines and the network coverage



Rolling stock demand - 3000 metro cars





Achievements, facts and figures

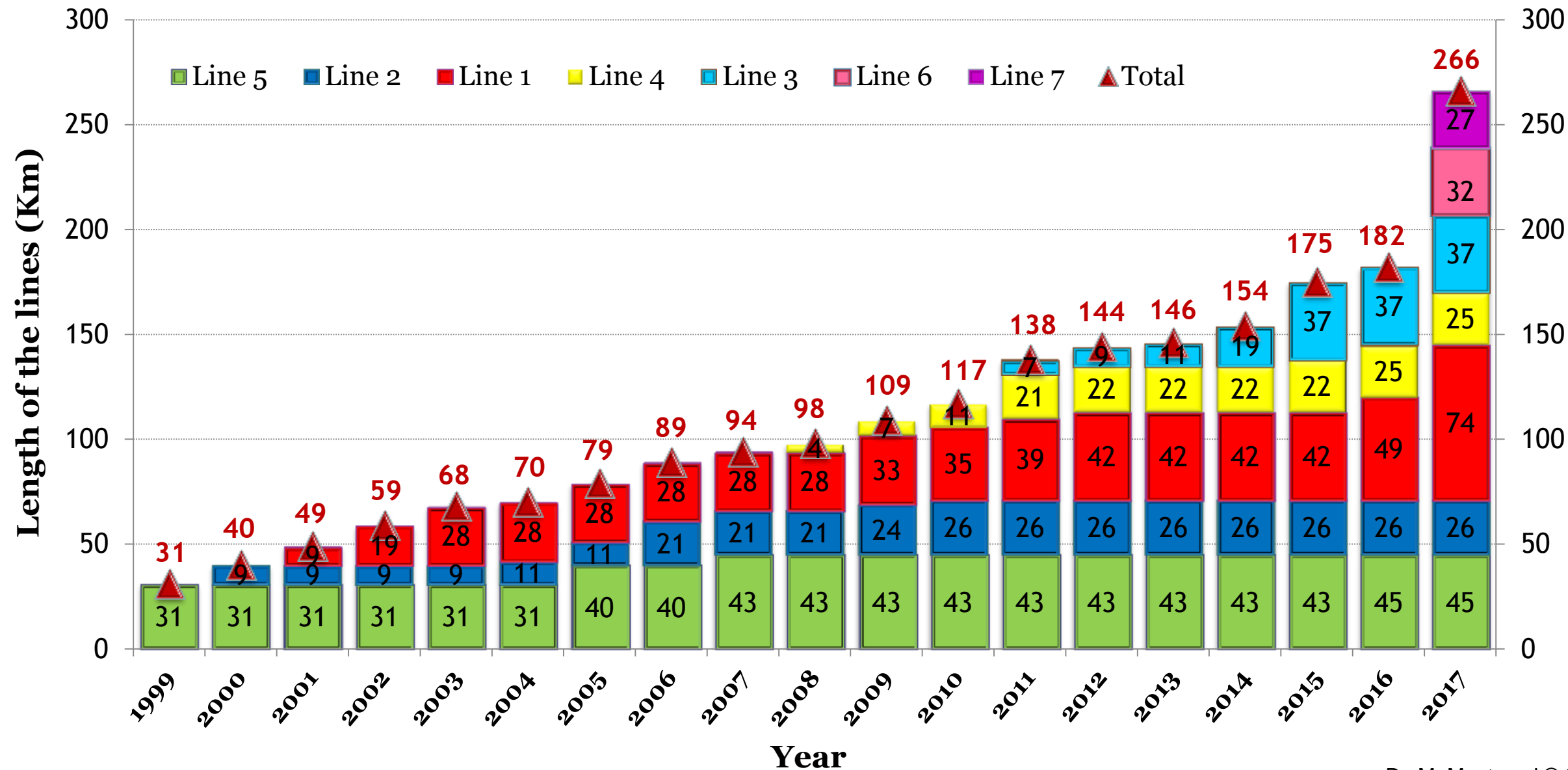


1. Tunnel and station statistics

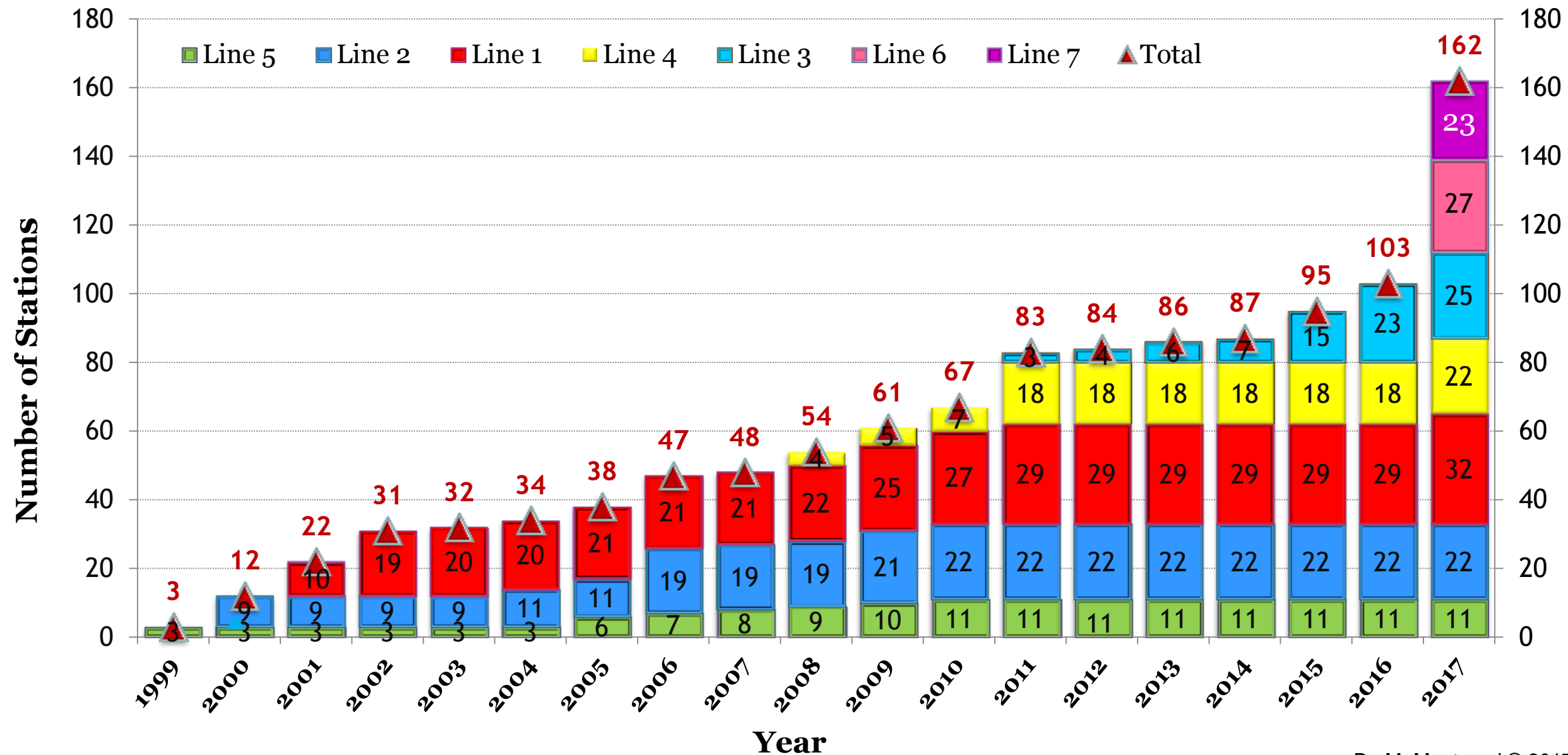


Line 1 tunnel

Length of the operational lines - September 2017



Number of the operational stations - September 2017

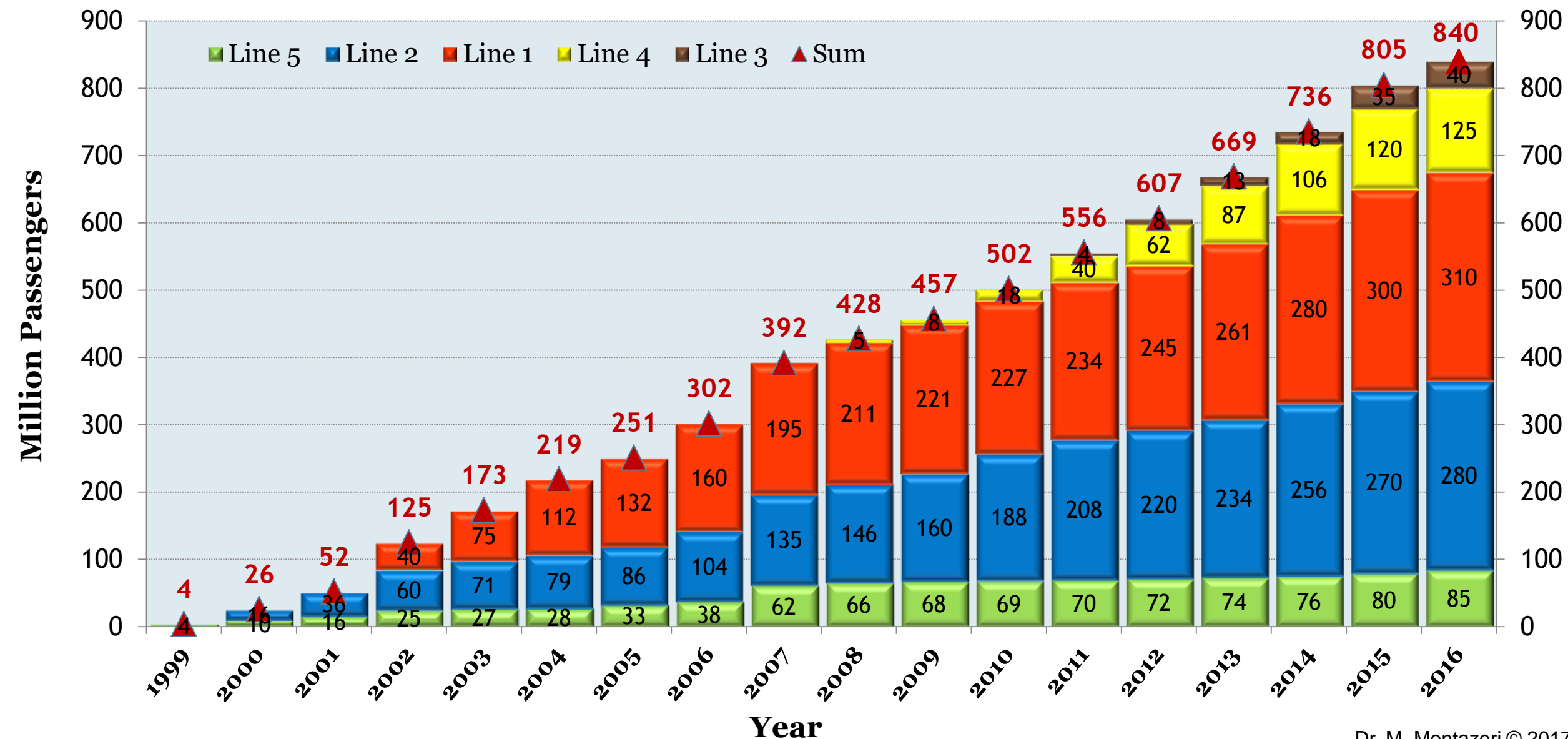


2. Passenger statistics



Line 2 station

Yearly ridership



3. Artworks in metro stations

- + 160 stations
- + 1600 artworks in stations
- On average 10 artworks/station



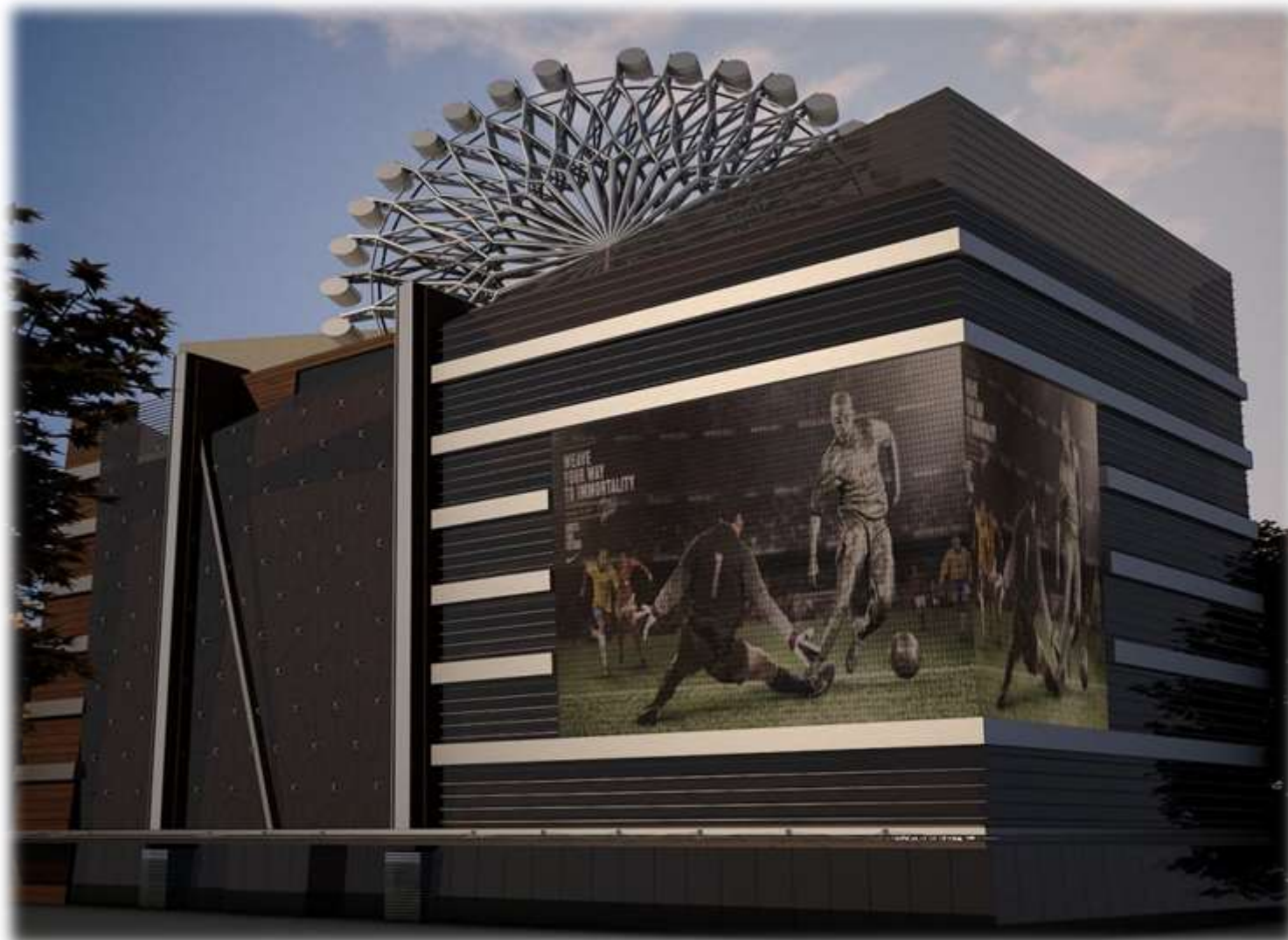
Artworks in metro stations



Artworks in metro stations



4. Property development model



Line 1 station 3D Model

Property development model

Proposed solution to finance the project

- ❖ TUSRC: Layout
- ❖ Municipality: Land + Permission
- ❖ Government: Loan + E&M
- ❖ Private Sector: Construction

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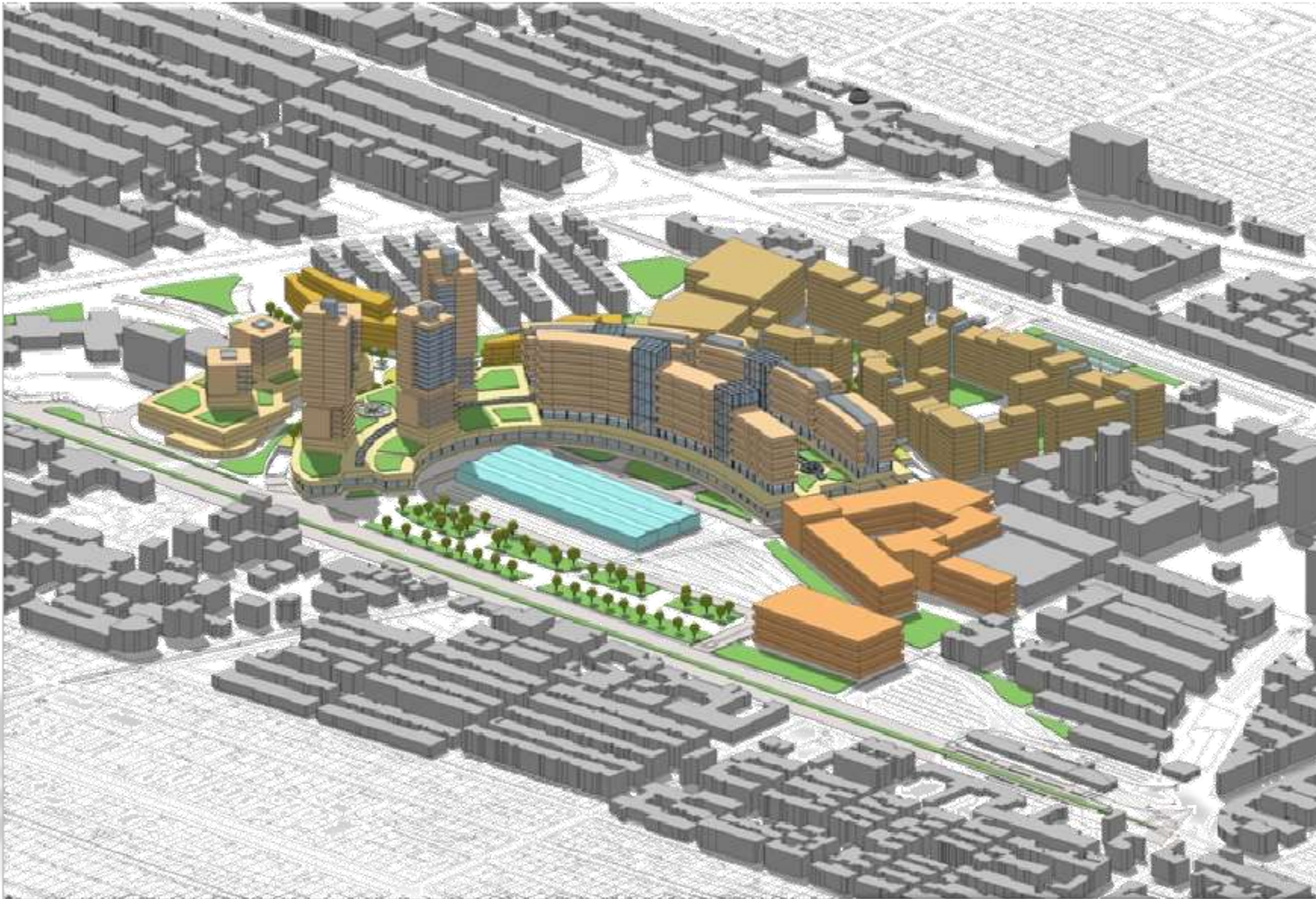
Property development model



The revenue generated from property development model covers more than 50% of metro construction cost

There are +40 station development projects underway with a total value of US +\$3.5 Billion

Property development model



Property development model



5. Metro funding

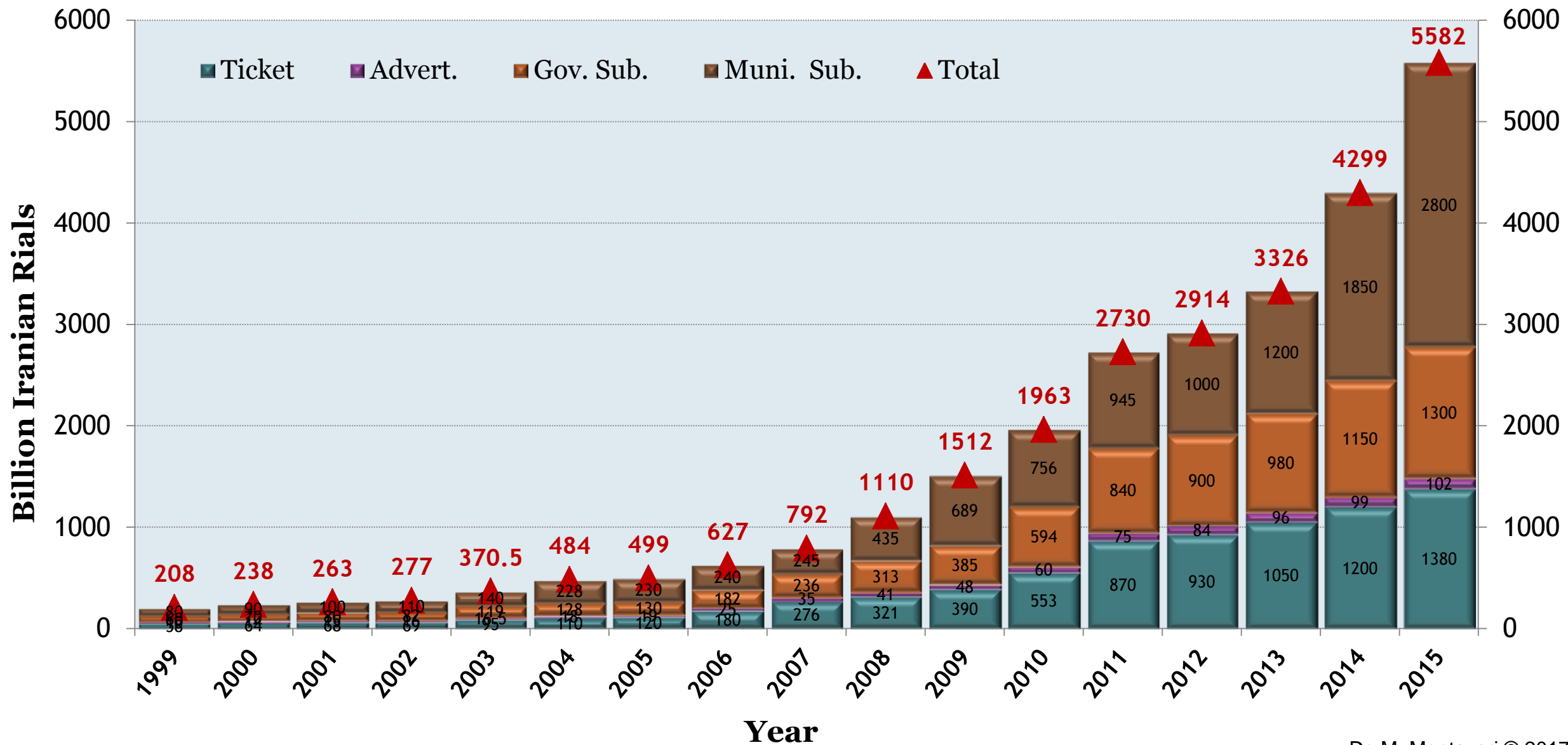


Funding contribution sources: construction

Year	Government	Municipality		Local Loans	Foreign Loans
		Cash	Station Complexes		
1987-1996	By Government and Municipality			57%	43%
1997-2005	34%	36%	0	20%	10%
2006-2009	42%	36%	18%	4%	0
2010	35%	13%	48%	4%	0
2011-2012	27%	23%	50%	0	0
2013-2014	25%	25%	50%	0	0
2015-2017	11%	89%		0	0

No international long-term finances since 2006

Funding contribution sources: operation

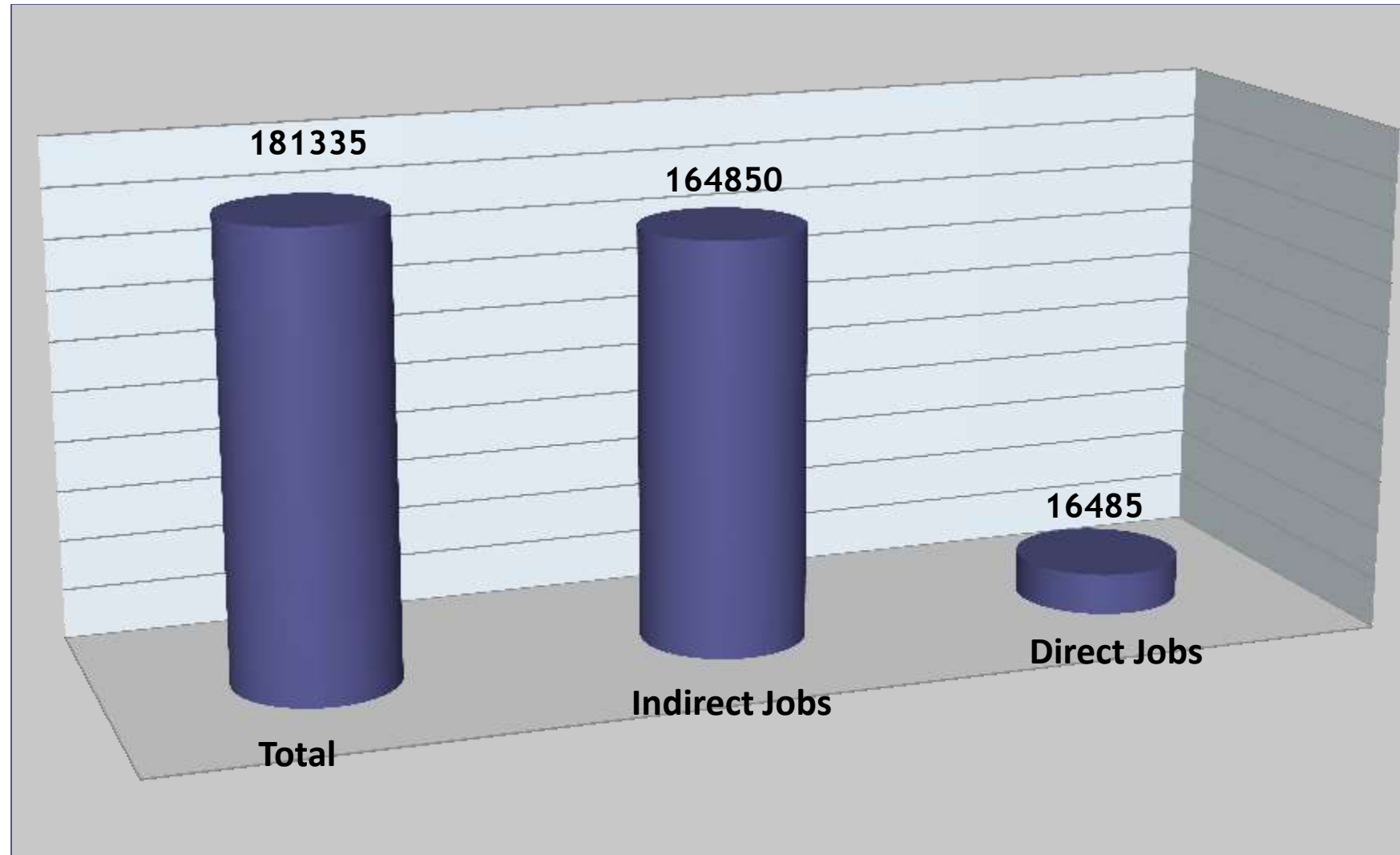


6. Employment



Metro control center

Number of jobs created by one metro line of 20 Km

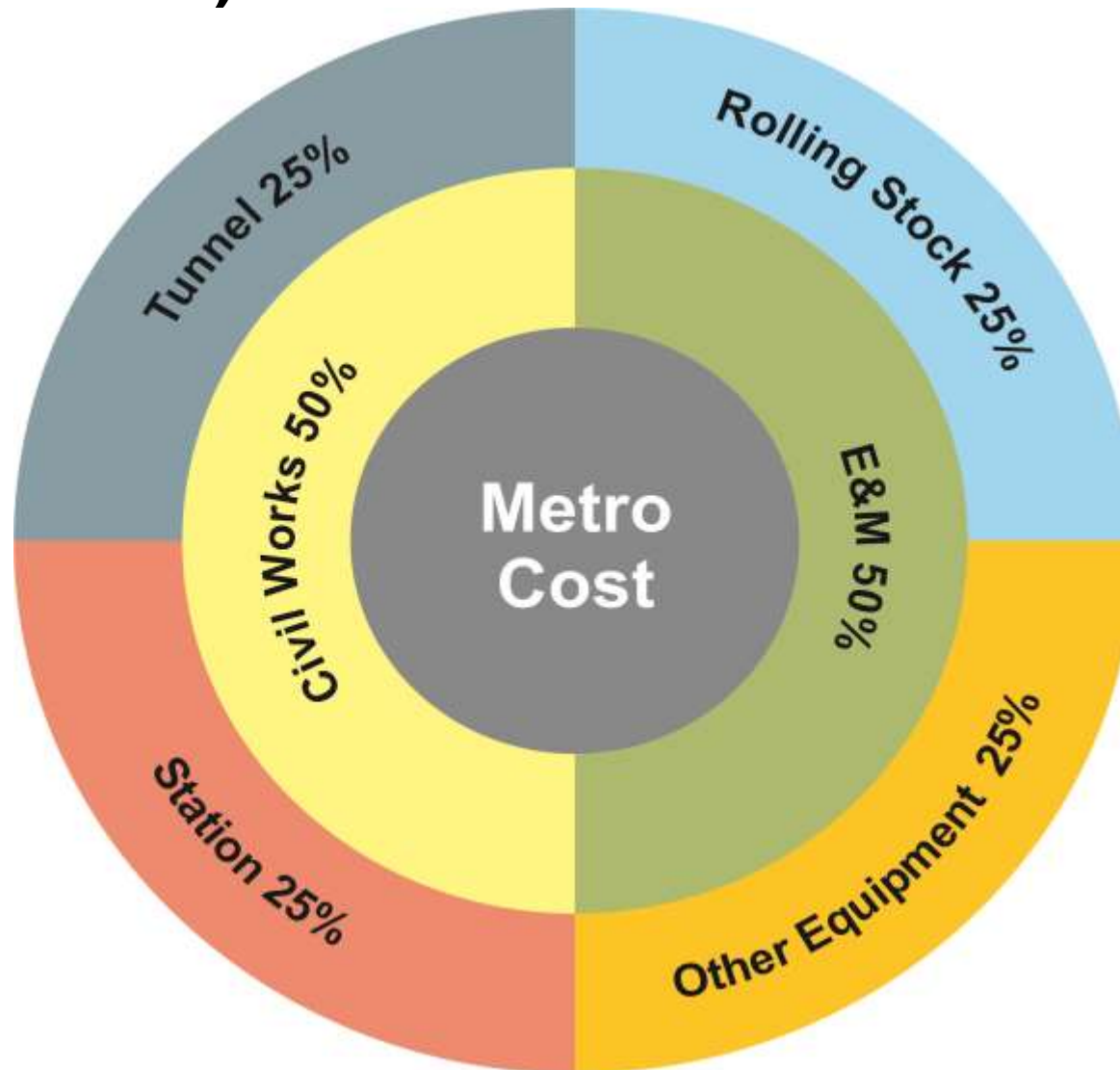


Based on data from different industry sections, the ratio of direct and indirect jobs in metro is estimated to be 10

7. Local production



Metro cost (approx.)



Up to 85% of metro facility is produced locally

Local train production

40%
value of urban metro cars



60%
value of suburban metro cars

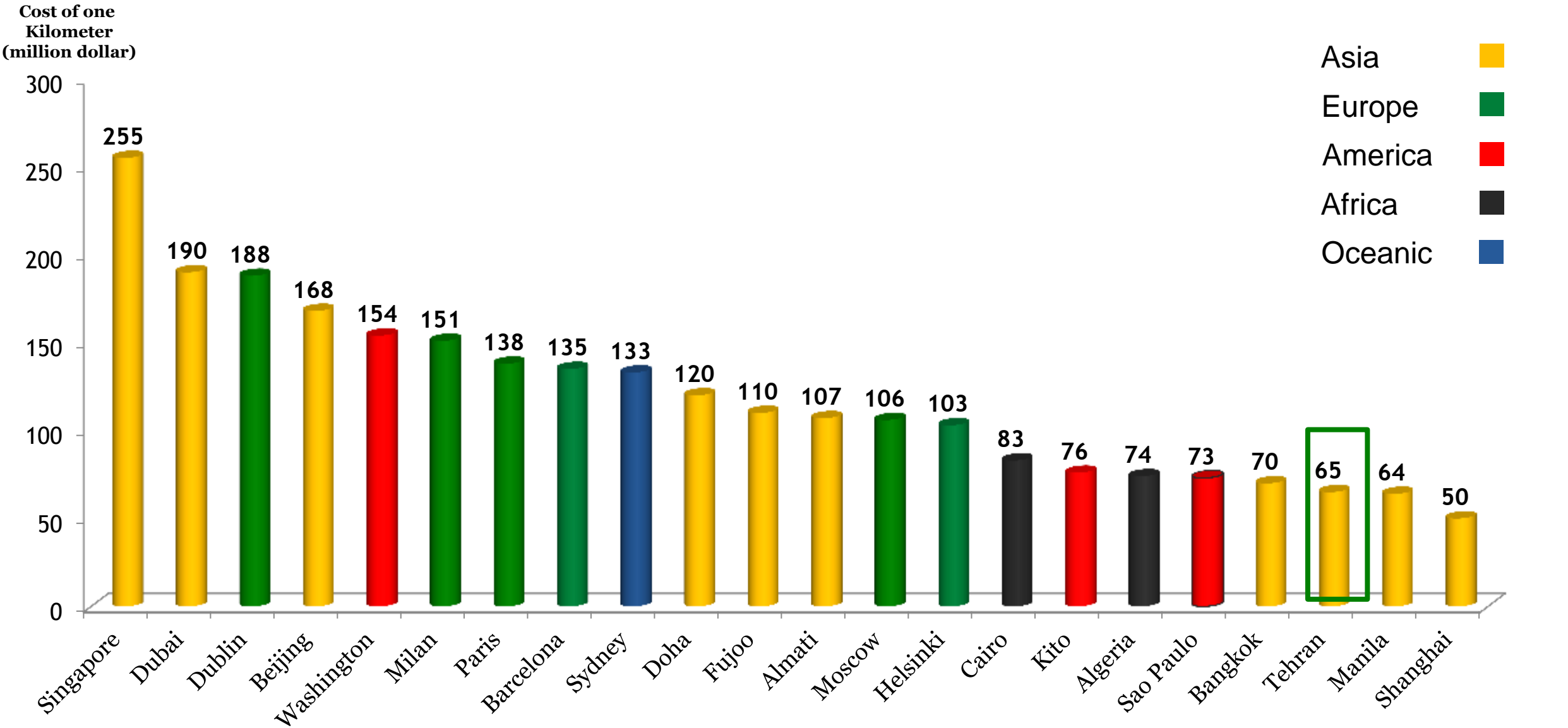
Metro equipment (more than 85% is locally produced)



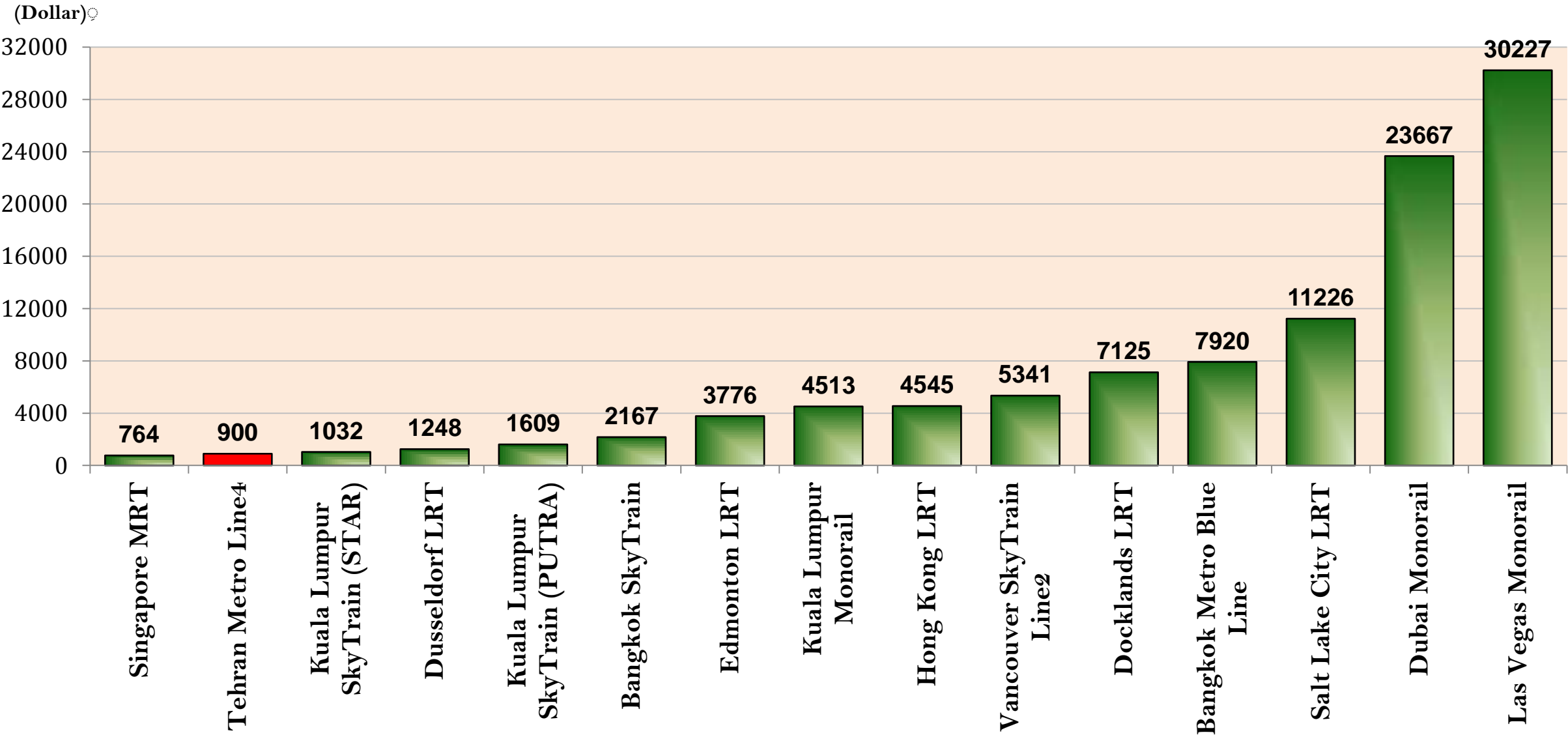
8. Cost efficiency



Cost comparison for one kilometer of rail system in different countries



Price index for one kilometer per passenger capacity

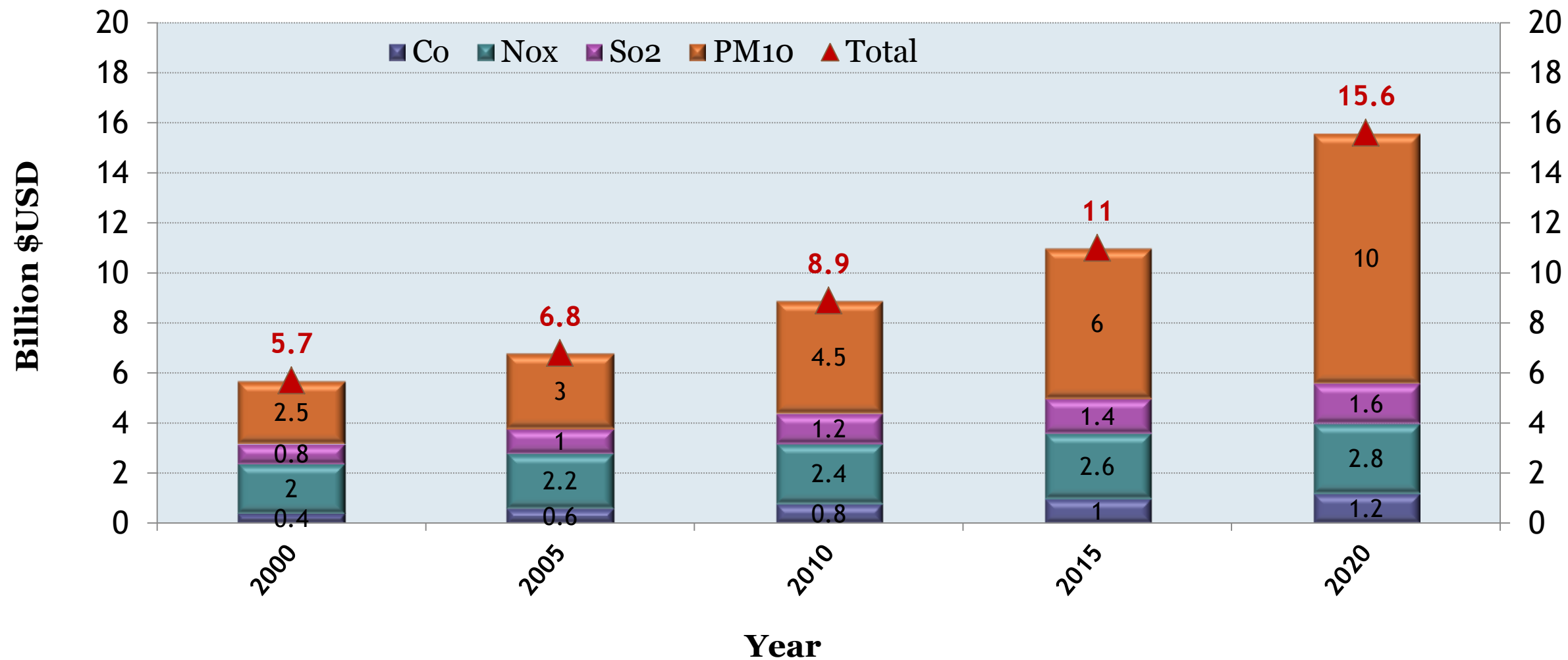


9. Higher quality of life



Lines 3 station

Air pollution damages in Iran



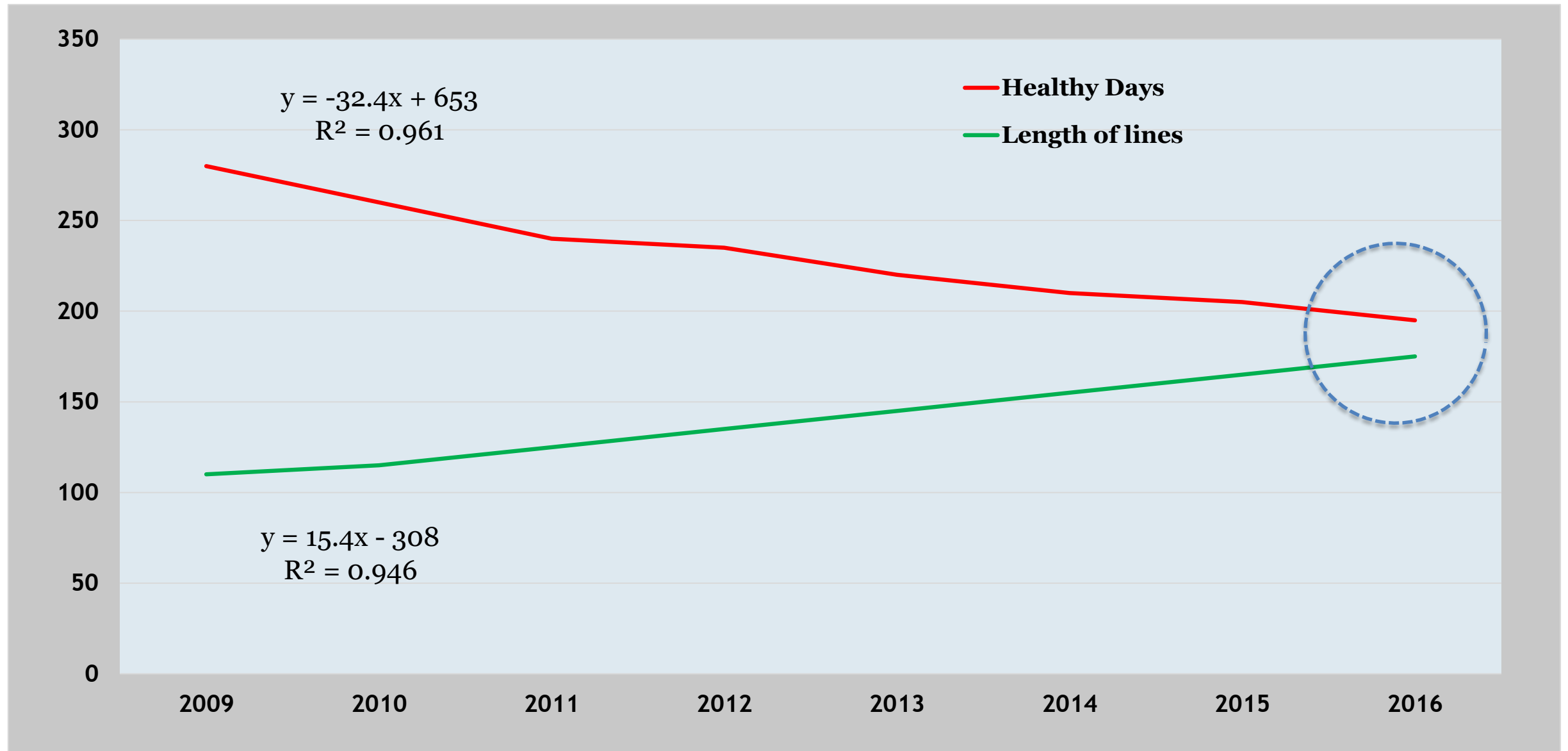
Metro saves 0.67 liter of gas per passenger trip

Fuel consumption and Tehran metro network

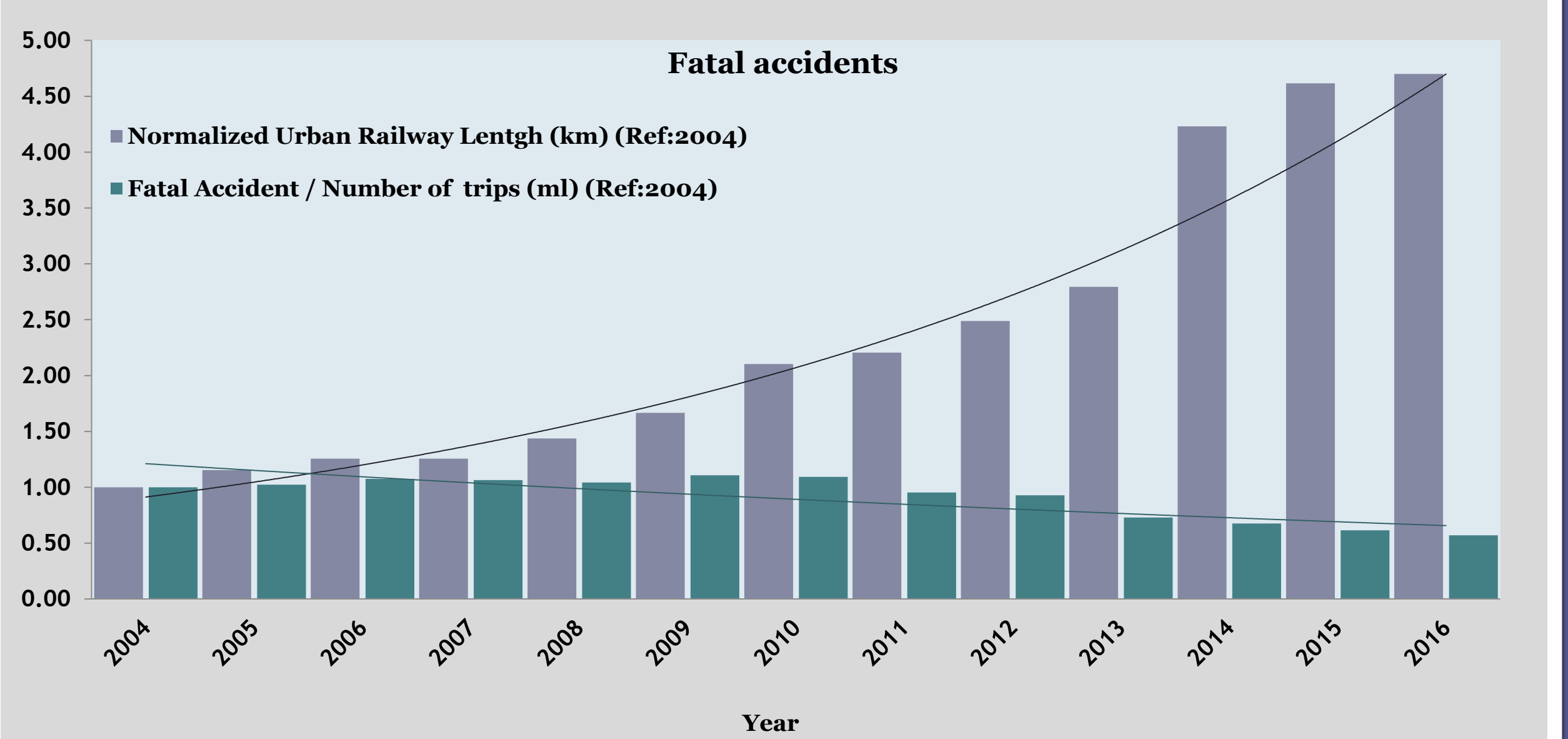
Fuel consumption saving		Million trips	Description
Million \$USD	Million liter		
91	336	560	Number of trips till 2004
2,430	9,000	15,000	Trip estimation till 2021
12,809	47,440	79,000	Trip estimation till 2051

Price of one liter of imported fuel is 23 cent

10. Building new metro lines will result in less polluted days in the capital city



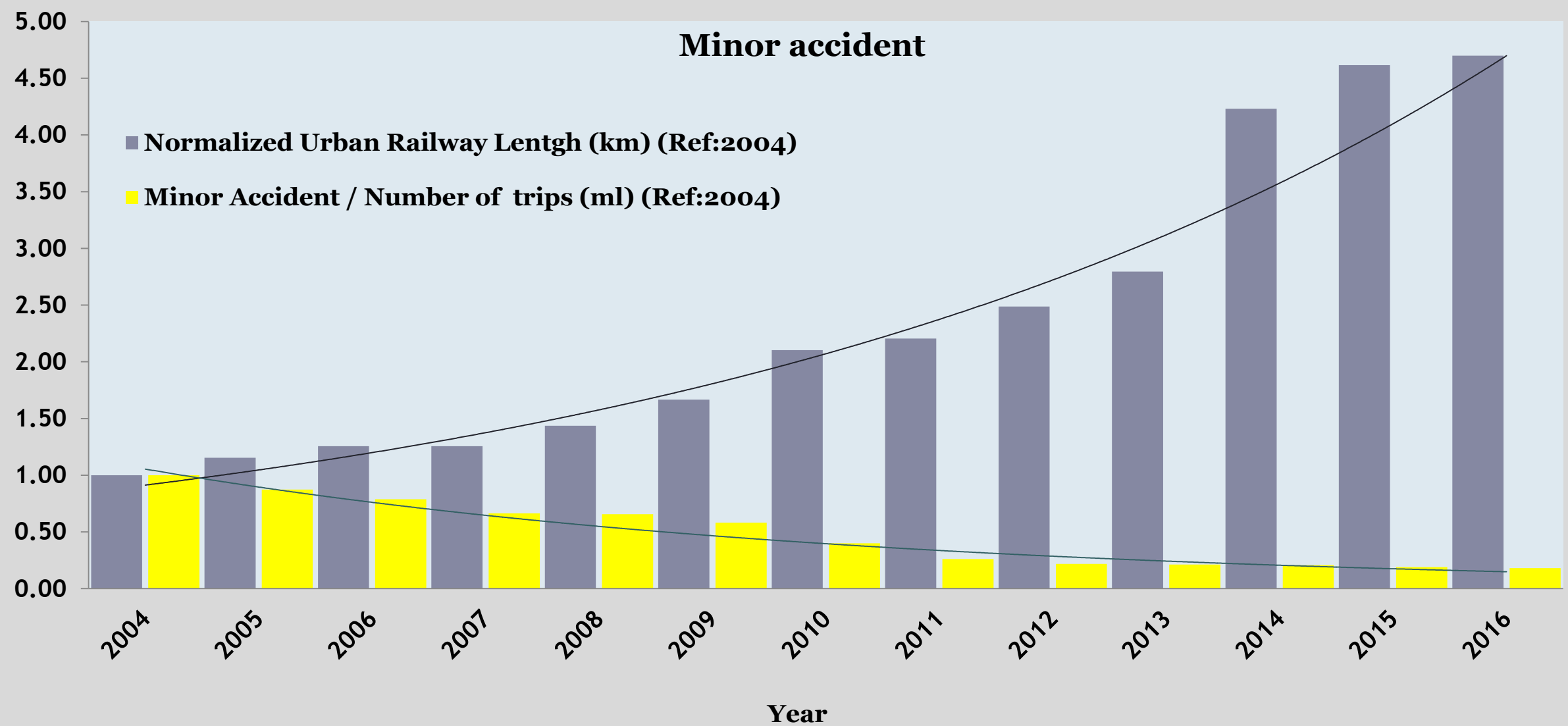
11. Decrease in car accidents as metro expands



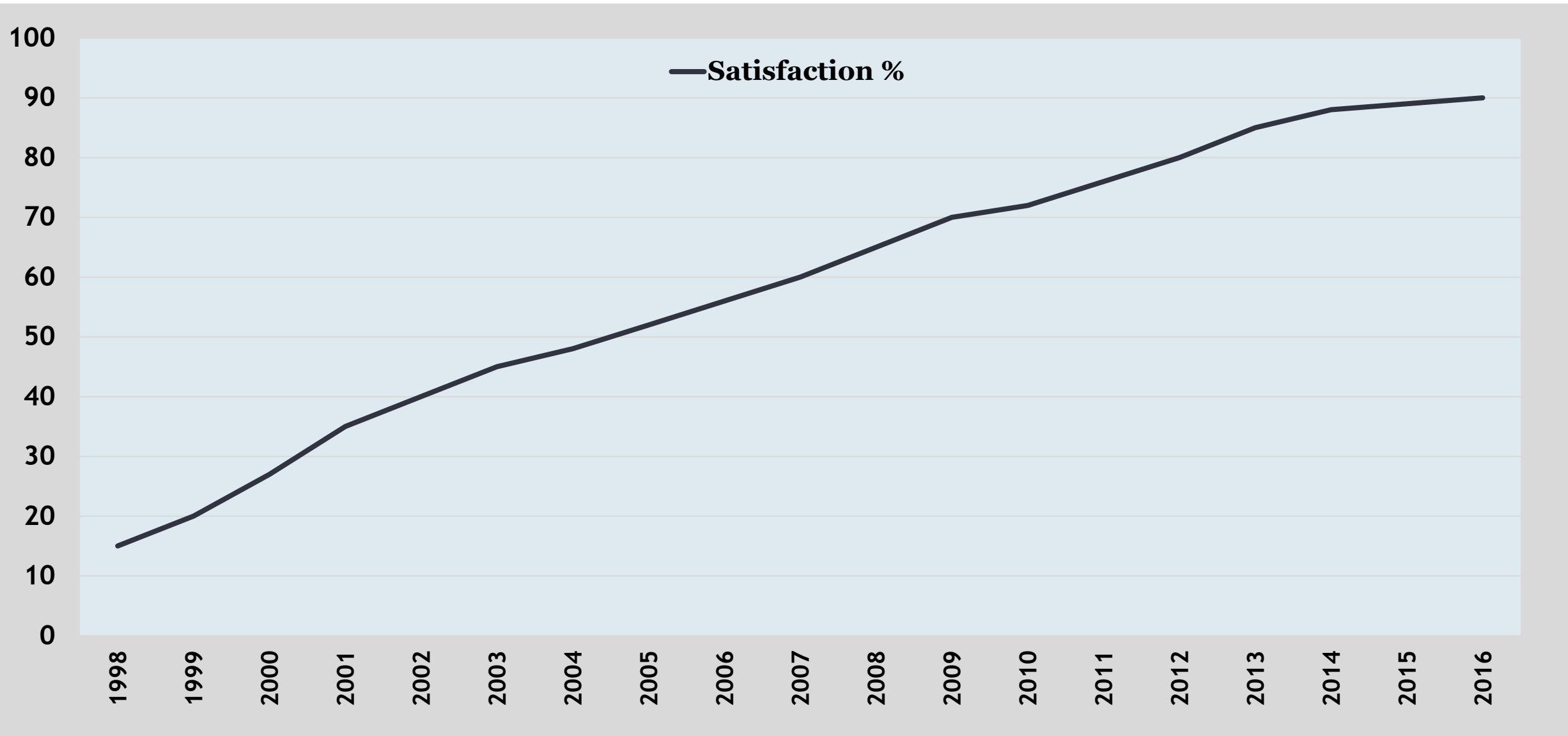
Decrease in car accidents as metro expands



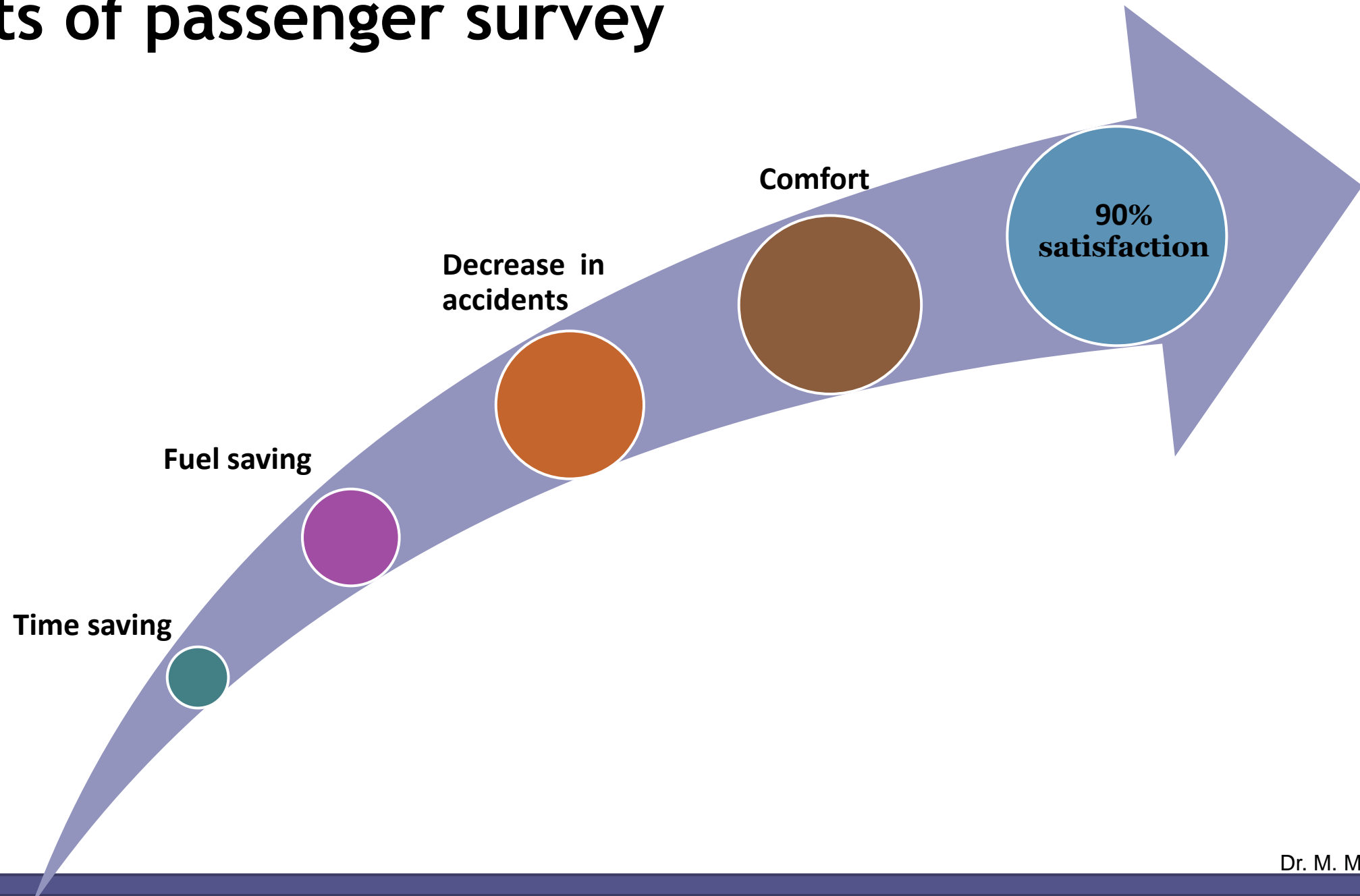
Decrease in car accidents as metro expands



12. Passenger satisfaction



Results of passenger survey



Thank you for your time

