

Thailand's Rapid Urbanization and Environmental Challenges

Bhanupong

Lecture 30

**WHAT WE LEARN
WITH PLEASURE
WE NEVER FORGET.**
-Alfred Mercier

Main Themes

1. Decentralization process of the primate cities
2. Costs of unsustainable urbanization
3. Environmental Kuznets Curve (EKC)

Stages of Decentralization

- First stage: Declining population density in the primal city: slowdown population growth and residential relocation
- Second stage: Standardized industries are relocated from the primal city.
- Third stage: declining share of the primal city's GDP

Characteristics of sustainable Urbanization

(A) Declining population density in the primal cities

(B) Declining urban poverty (lecture 27)

(C) Improving income equality (lecture 28)

(D) Improving quality of city life and environment

(A) Declining population density:

The first stage of **decentralization**

- Urban population growth in China and India has slowed down (Figure 1).
- Thailand has experienced *declining* population growth rate.
- Growth rate of Thailand's urban population has slowed down (Figure 2).
- Bangkok population has been increasing at a decreasing rate (Figure 3)
- As a result, the *population density* in Bangkok has been on a declining trend (Figure 4)

Figure 1. Urban population growth (%)

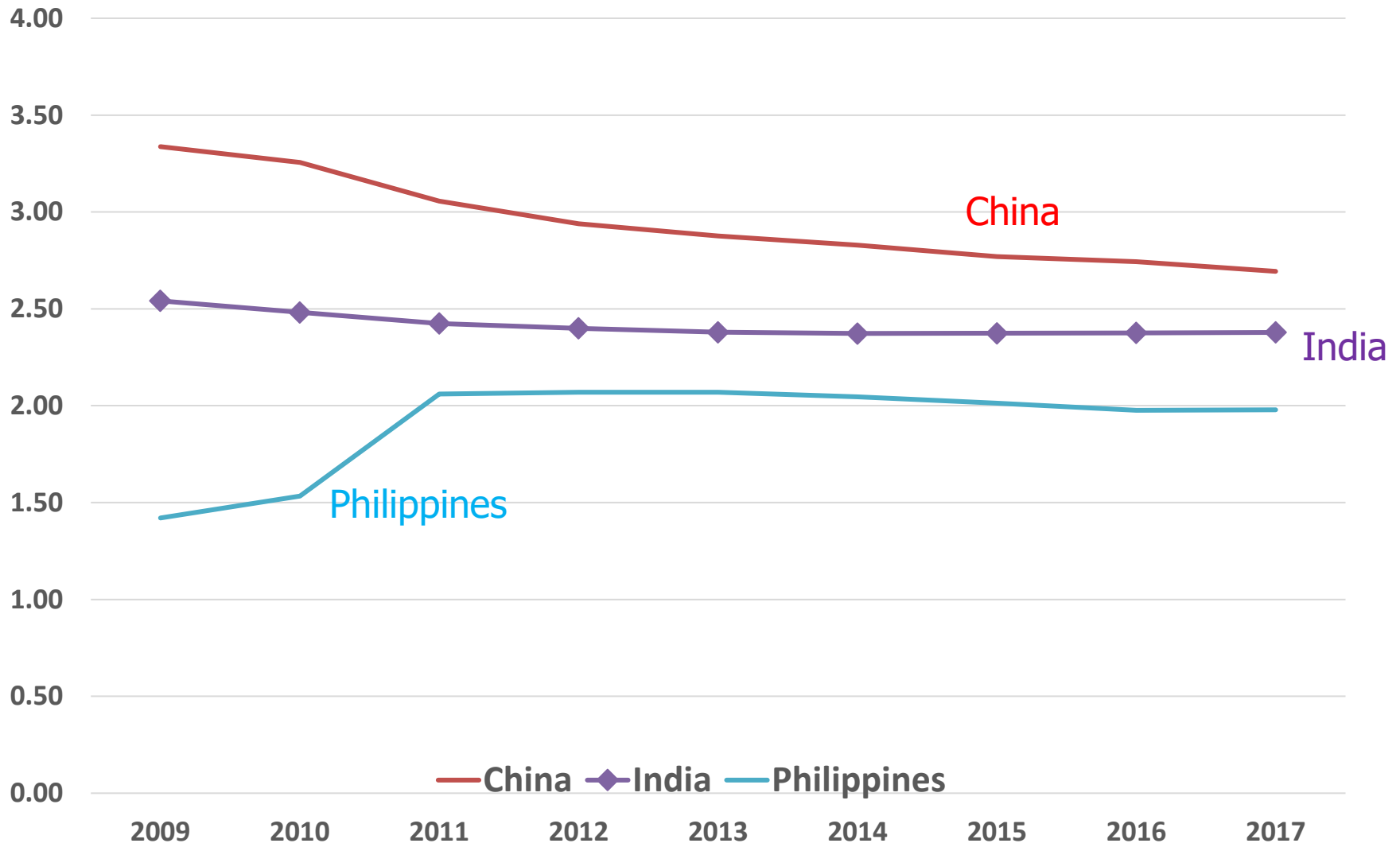


Figure 2. Urban population growth

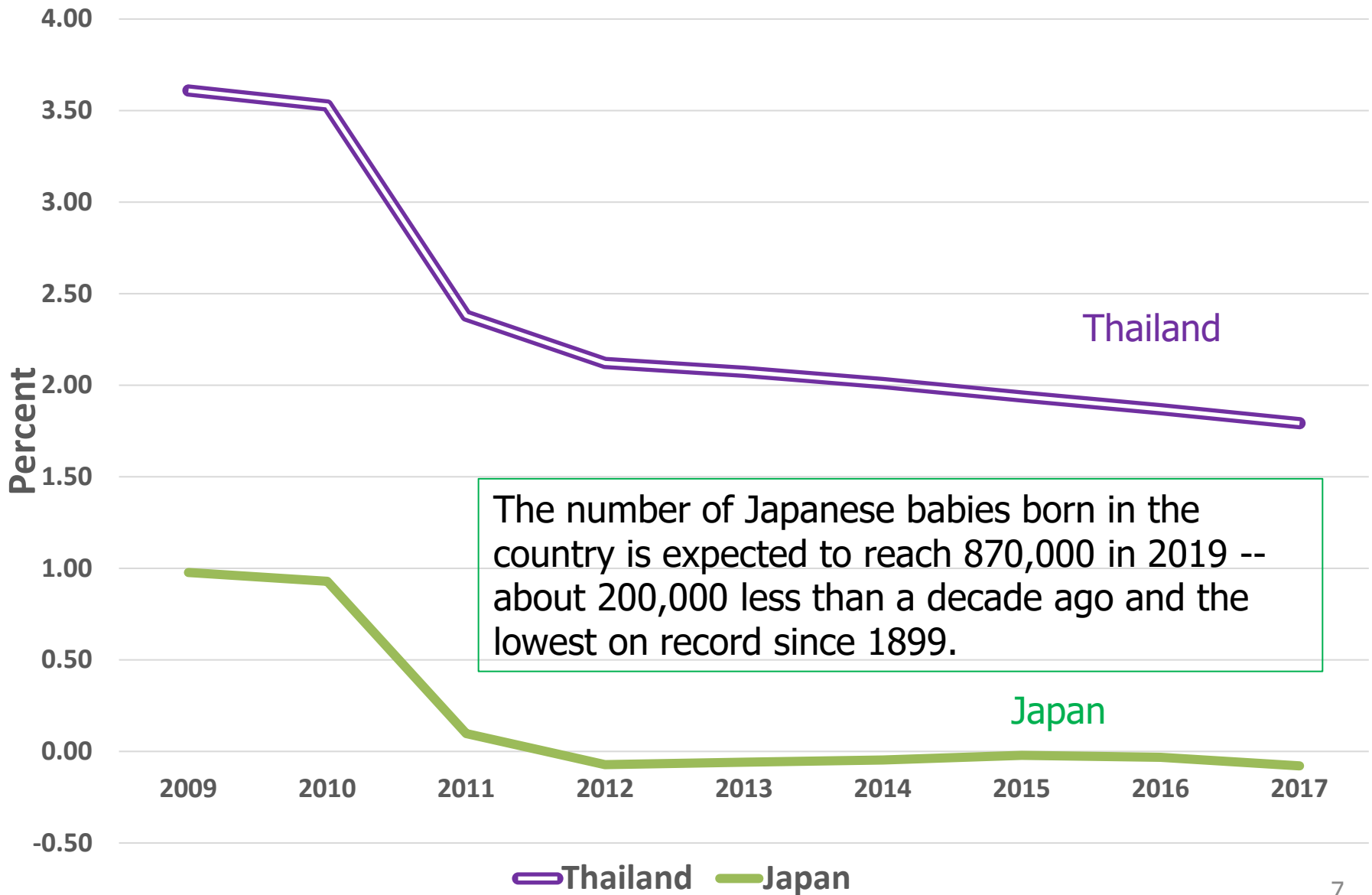


Figure 3. Bangkok population: Increased at a decreasing rate

Source: UN World Urbanization Prospects

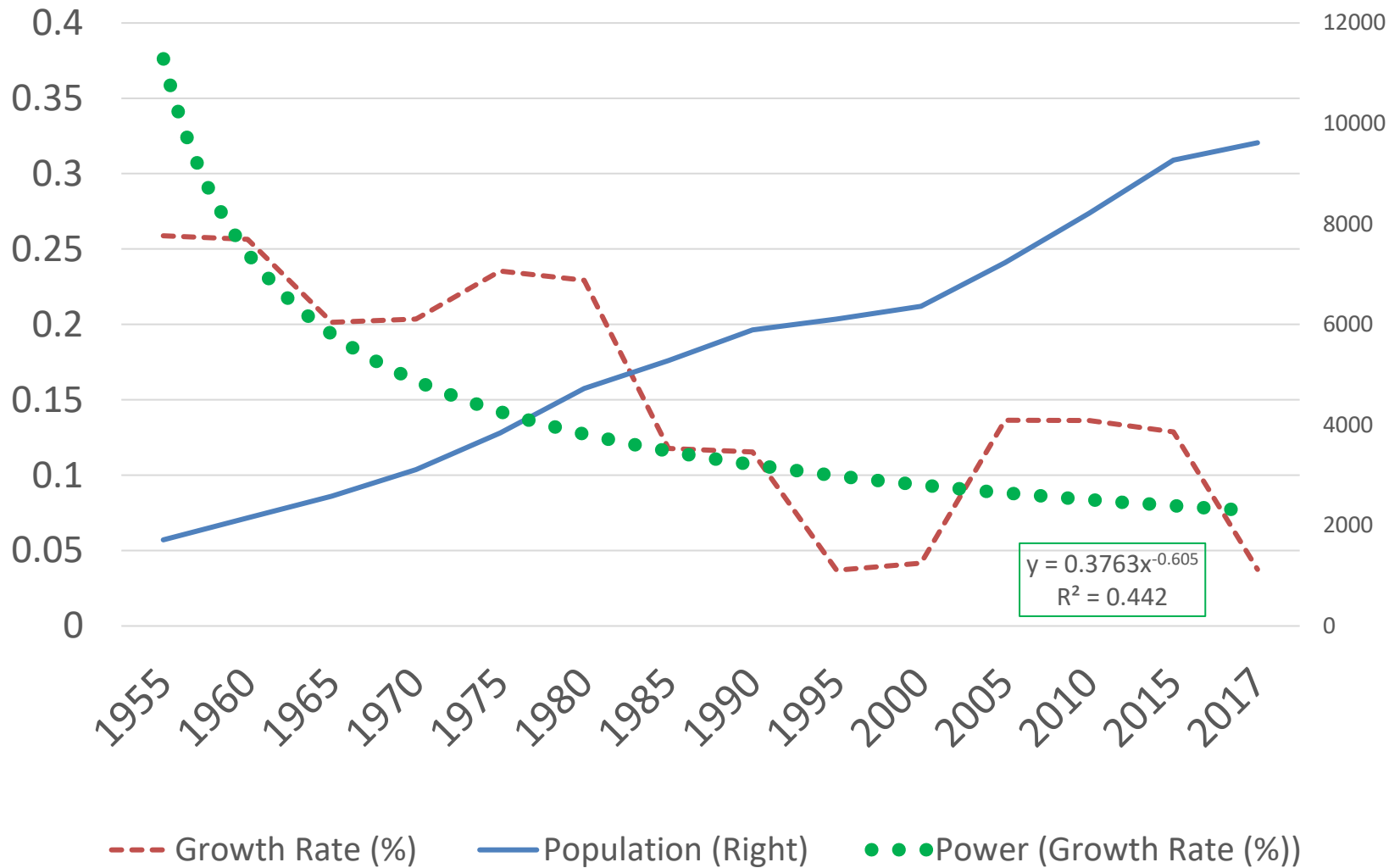


Figure 4. Size and growth of population in large cities in 2000

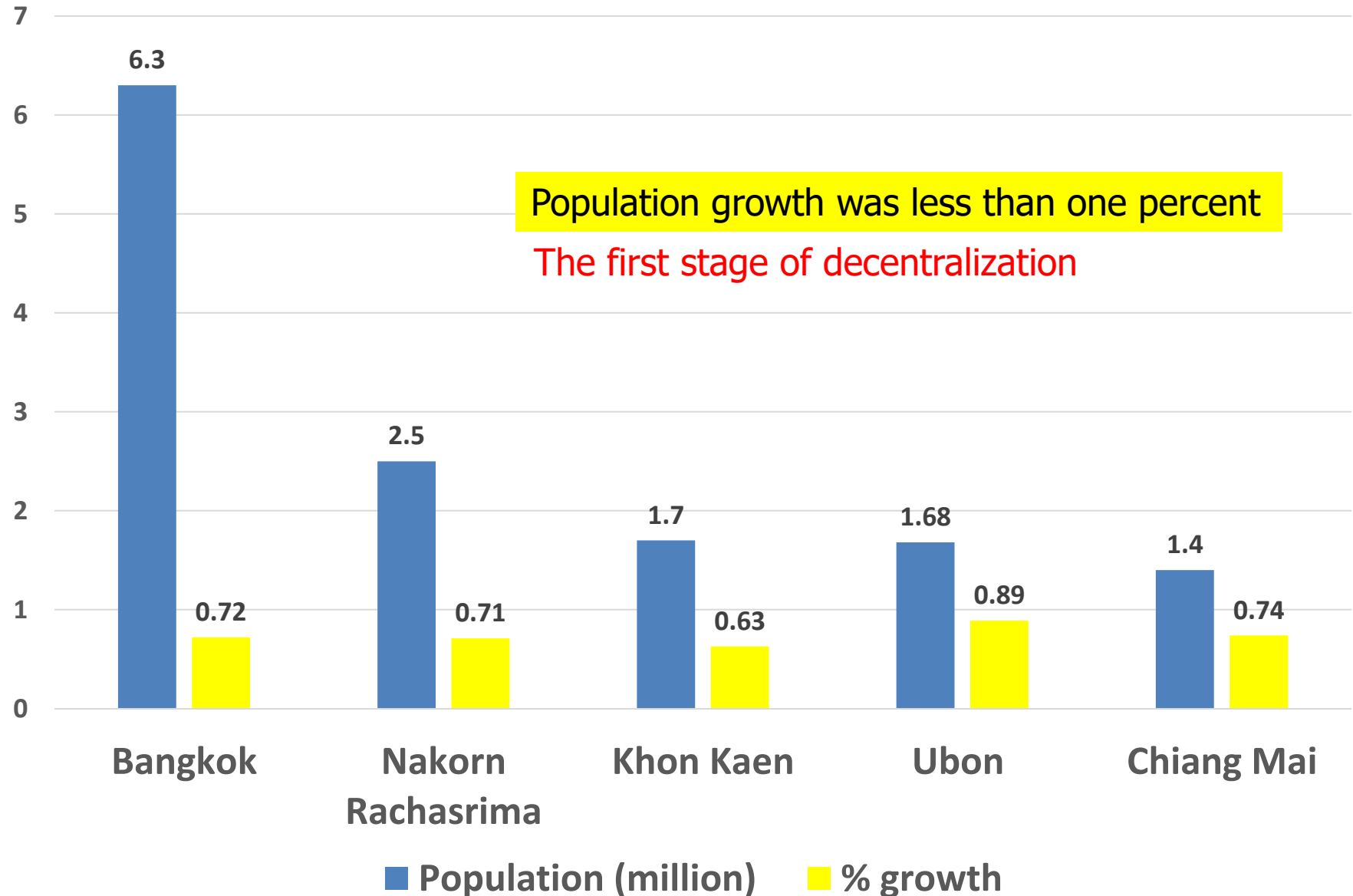


Figure 5. Rapid expansion of population in the **periphery** of Bangkok: Booming population in neighboring cities in 2000

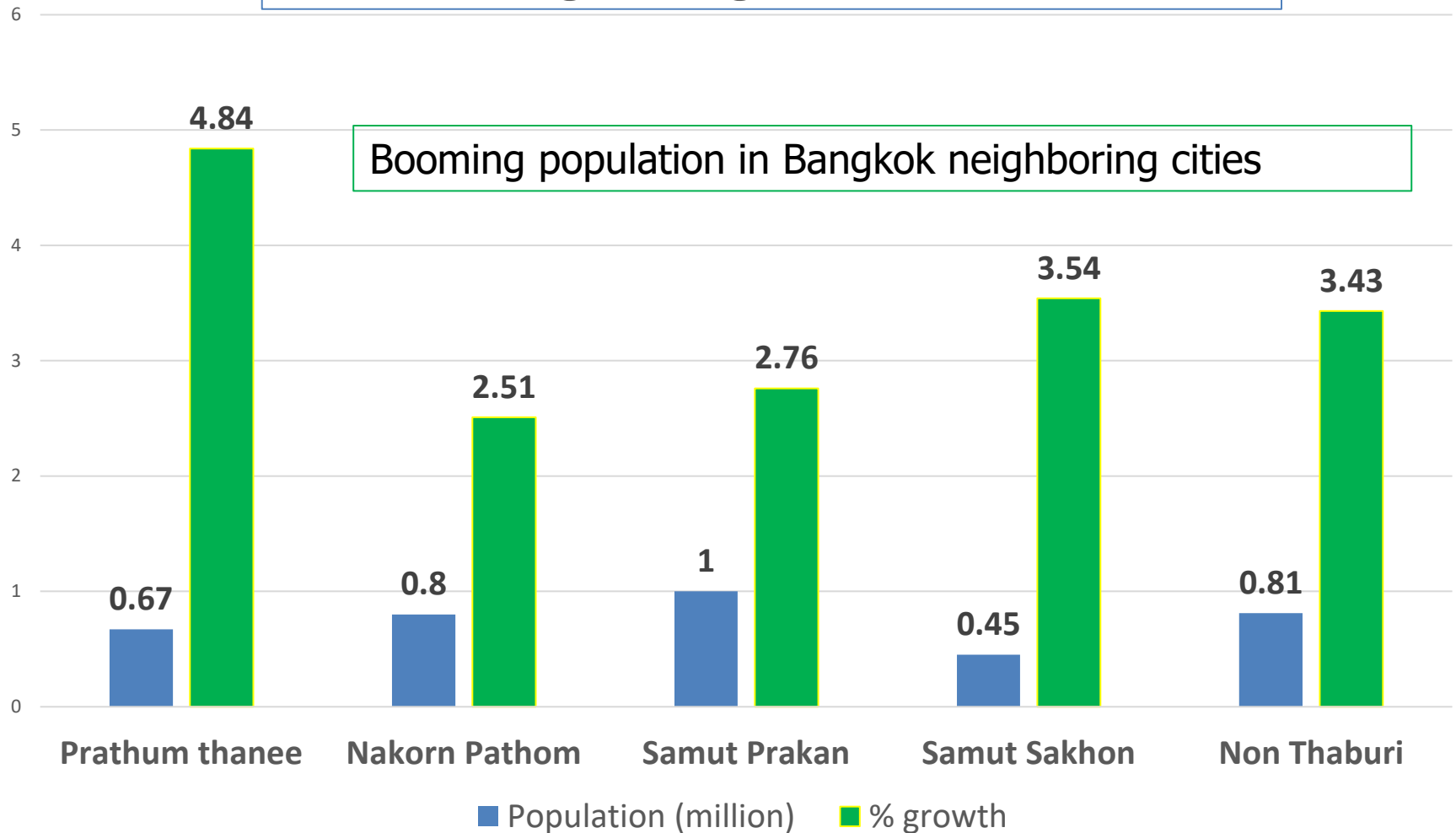
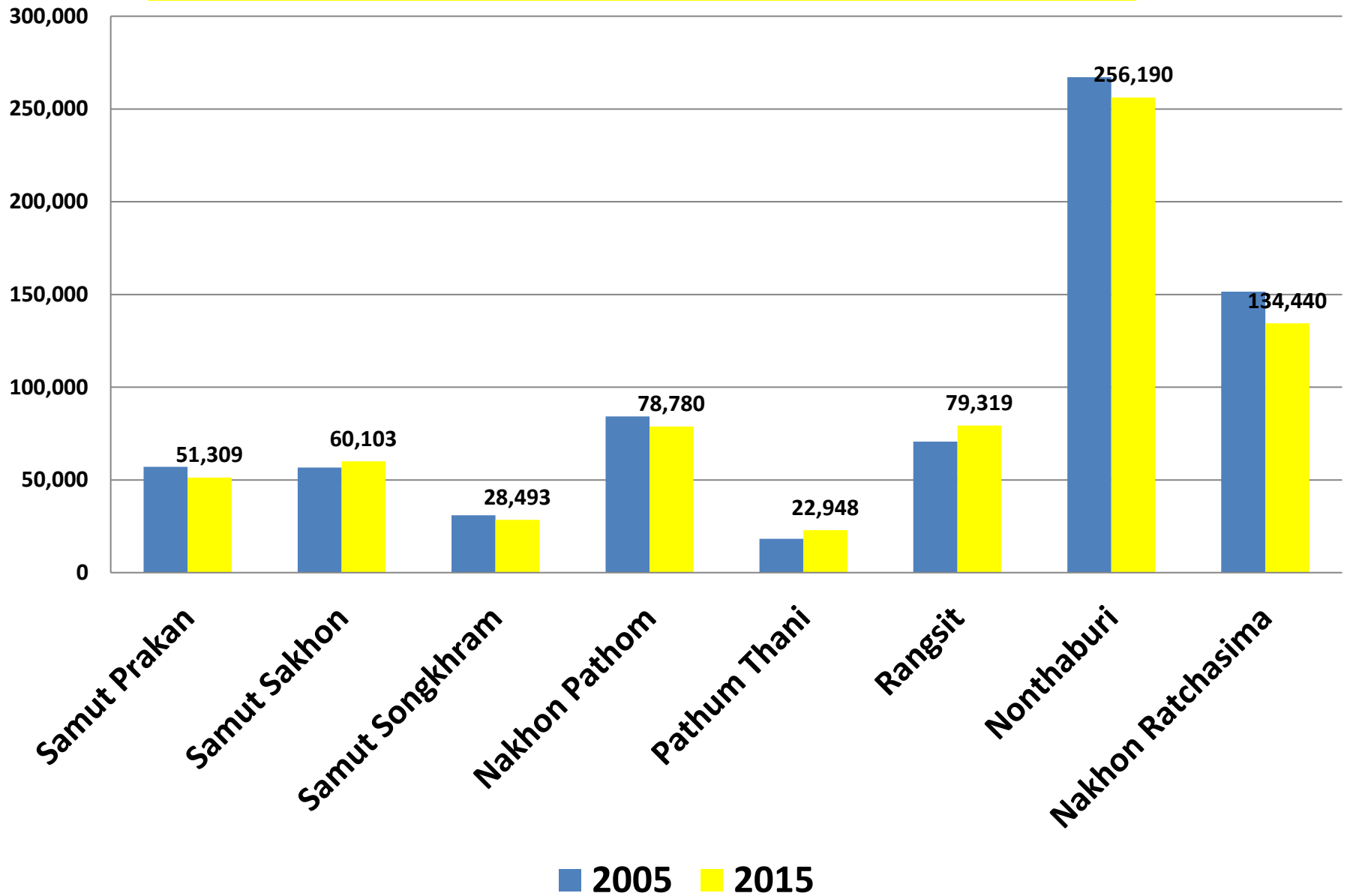


Figure 6. Stabilized population in big cities



The Second stage of decentralization:

Standardized industries are moving out of Bangkok

- It has already begun as *industries* are gradually moving away from Bangkok Metropolitan Region, because of higher production and transactions costs in BMR.
- Bangkok has encountered diseconomies of agglomeration, thanks to higher land prices and rent. If the trend continues, a more balanced process of urbanization will emerge with less concentration of industries in large cities.
- The degree of urbanization in Thailand has been slowing down in all regions.

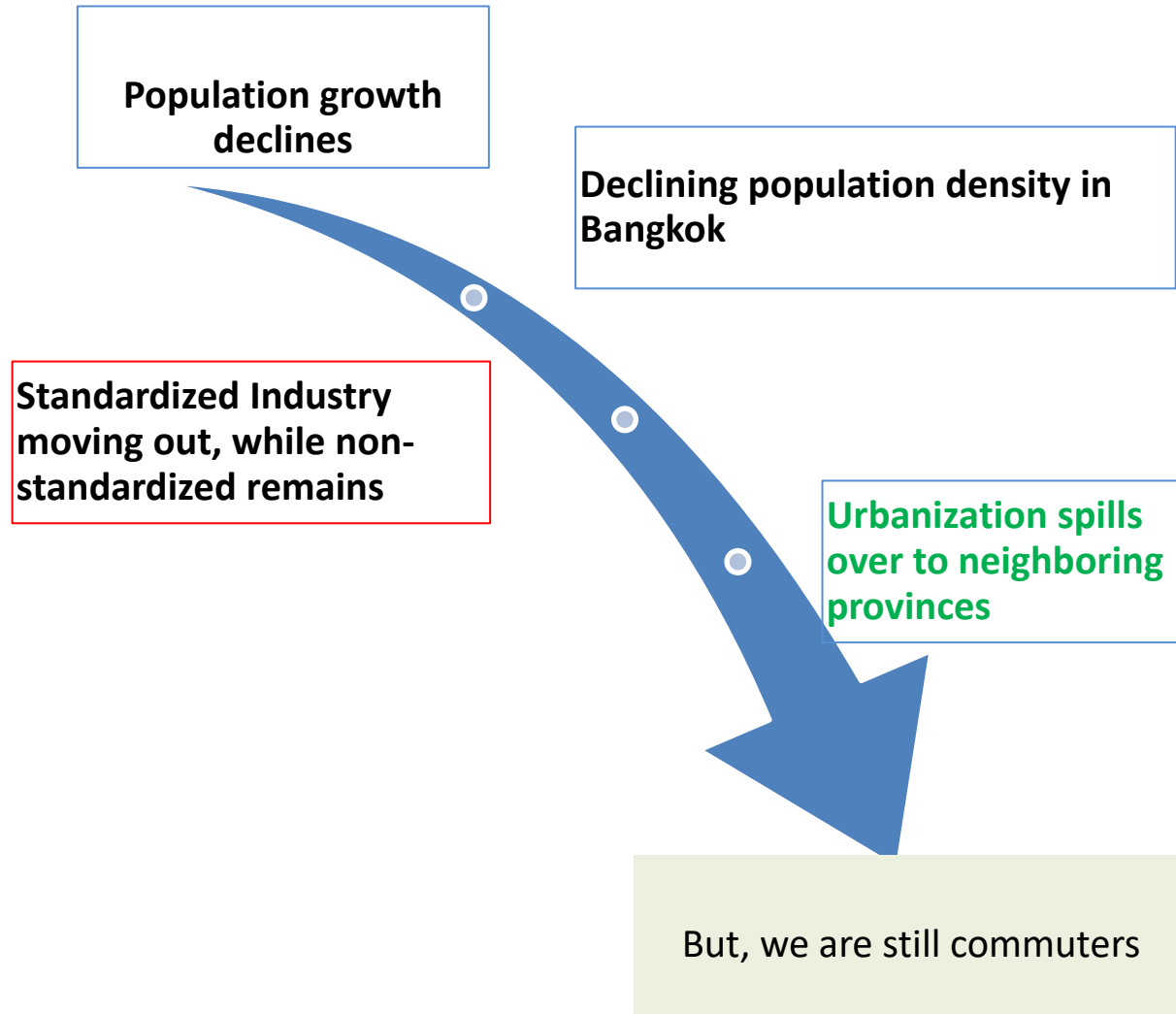
Declining Bangkok Primacy

- As the impact of diseconomies of scale became apparent, **Bangkok started to lose its comparative advantage in production.**
- ***Both*** shares of output and population in Bangkok has been declining.
- Output share of BMR declined from 53 percent in 1993 to 47.4 percent in 2000—confirming the second stage of de-concentration in suburban areas of Bangkok.
- The share in 2015?

Slowing down urbanization speed

- This encouraging trend implies that urbanization process in Thailand may be sustainable, because large cities of Bangkok Metropolitan Region would not be expanding without limit, although there is a lingering problem on the air quality in Bangkok.
- The major factor behind the slow urbanization process is the **sharp drop** in the **population growth rate**, reflecting the successful family planning programs.
- The relative size of economic activity in Bangkok Metropolitan Region has been declining gradually.

The share of output and population in Bangkok has been declining, as we are experiencing diseconomies of agglomeration



How to make urbanization desirable

- If the urban sector can provide better job opportunities with more stable income, urbanization is **not** a disaster and therefore should be **welcome**.
- The important question is *how* to prepare labors from rural areas to make them suitable for working in the urban sector and how to manage traffic jams caused by excessive concentration within the primate city.
- Industrial competitiveness declines as Bangkok starts experiencing *diseconomies of agglomeration*
- Lack of management to maintain effective and efficient institutional capability (Kor Tor Mor's Blunders)

Car Registrations in Thailand increased to 47,916 in March from 43,879 in February of 2019.

Car Registrations in Thailand averaged 22,673 from 1989 until 2019, reaching an **all time high of 66,668 in March of 2013** and a **record low of 1,690 in December of 1998**.



SOURCE: TRADINGECONOMICS.COM | DEPARTMENT OF LAND TRANSPORT, THAILAND

We are commuters

- Urbanization has already spilled over from Bangkok into surrounding provinces.
- A large number of Bangkok's 10 million people now commute between their residences in Bangkok's suburbs or these five provinces and their offices are in downtown Bangkok.
- Bangkok should learn from the experience of other well-run cities around the world.
- The concept of **satellite towns** should be explored and introduced in metropolitan Bangkok when and where relevant.

Metropolis- Satellite Model

- A satellite town can be understood by thinking of the concept of a satellite itself. *A man-made satellite is launched into orbit.*
- This object is within Earth's orbit. *A satellite orbits the earth. However, it is not part of Earth itself.*
- This is exactly how a satellite town comes to be, as it is *a smaller city that is near a larger metropolis.*
- It might even have small degree of influence from the nearby metropolis
- In urban planning, a satellite town is a smaller metropolitan area located close to a bigger metropolitan area.

Satellite-town model of city development

- Under the satellite-town concept, now widely applied in many major cities in Germany and other European countries, **a city should be divided into many residential areas and suburbs.**
- *Each area is made self-sufficient, complete with office and commercial buildings, schools, hospitals, shopping centers and other facilities.*
- This should **reduce the necessity of residents having to take long commute hours.**
- It thereby does away with many urban problems related to ***large numbers of people moving about***, including traffic snarls and air pollution, among other problems, improving people's quality of life.

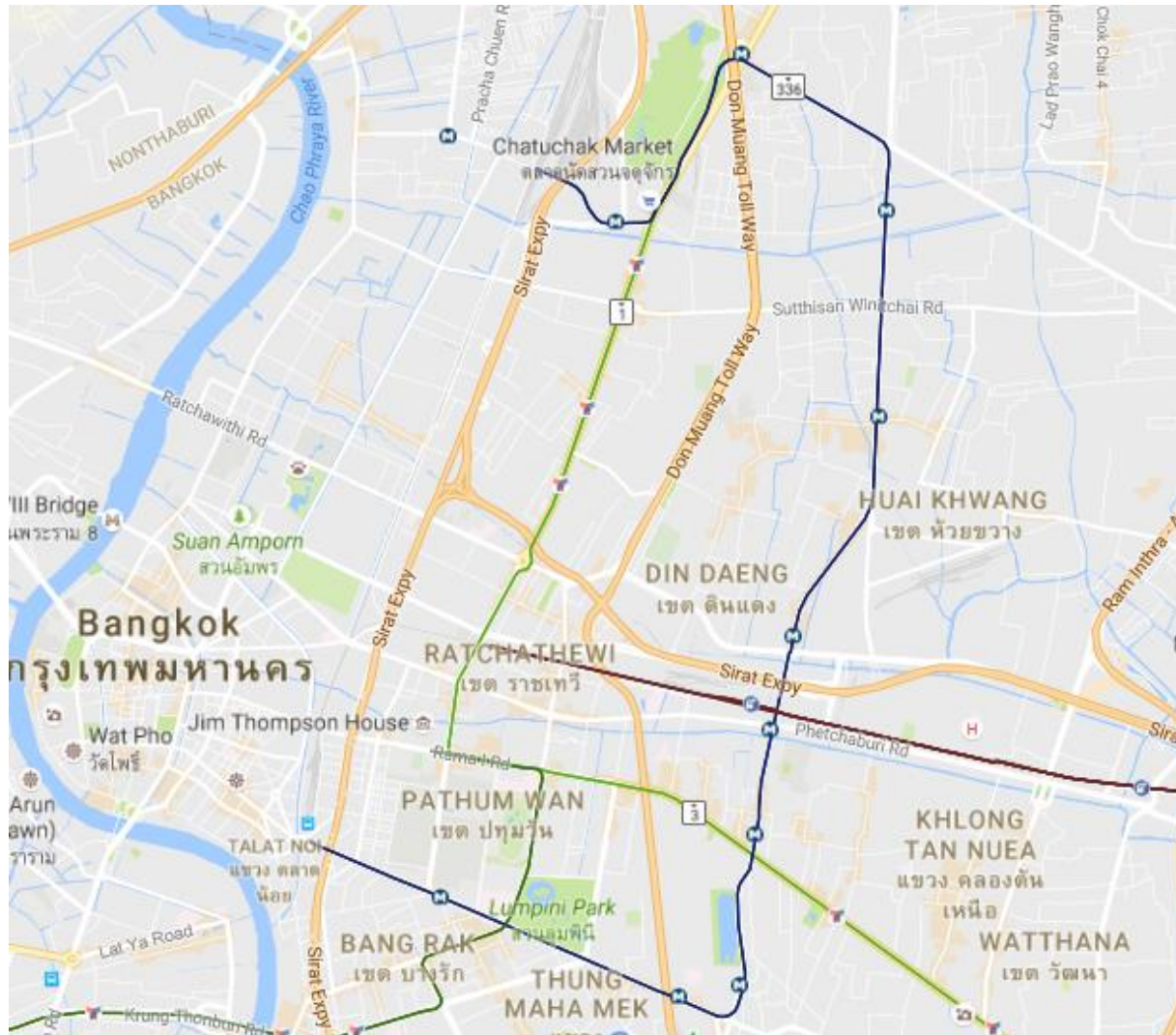
(D) Quality of city life and environment

The fourth characteristic of sustainable urbanization

- Bangkok has several parks, although the amount to a per-capita total **park area** is only 1.8 square meters.
- There is only **3.3** m² of **green space** per person in Bangkok, compared to an average of **39** m² in other cities across Asia.
- Bangkok thus **has 10 times less green space** than the region's urban areas.

A few parks in Bangkok

Bangkok's per capita park area is only **1.8** square meters.

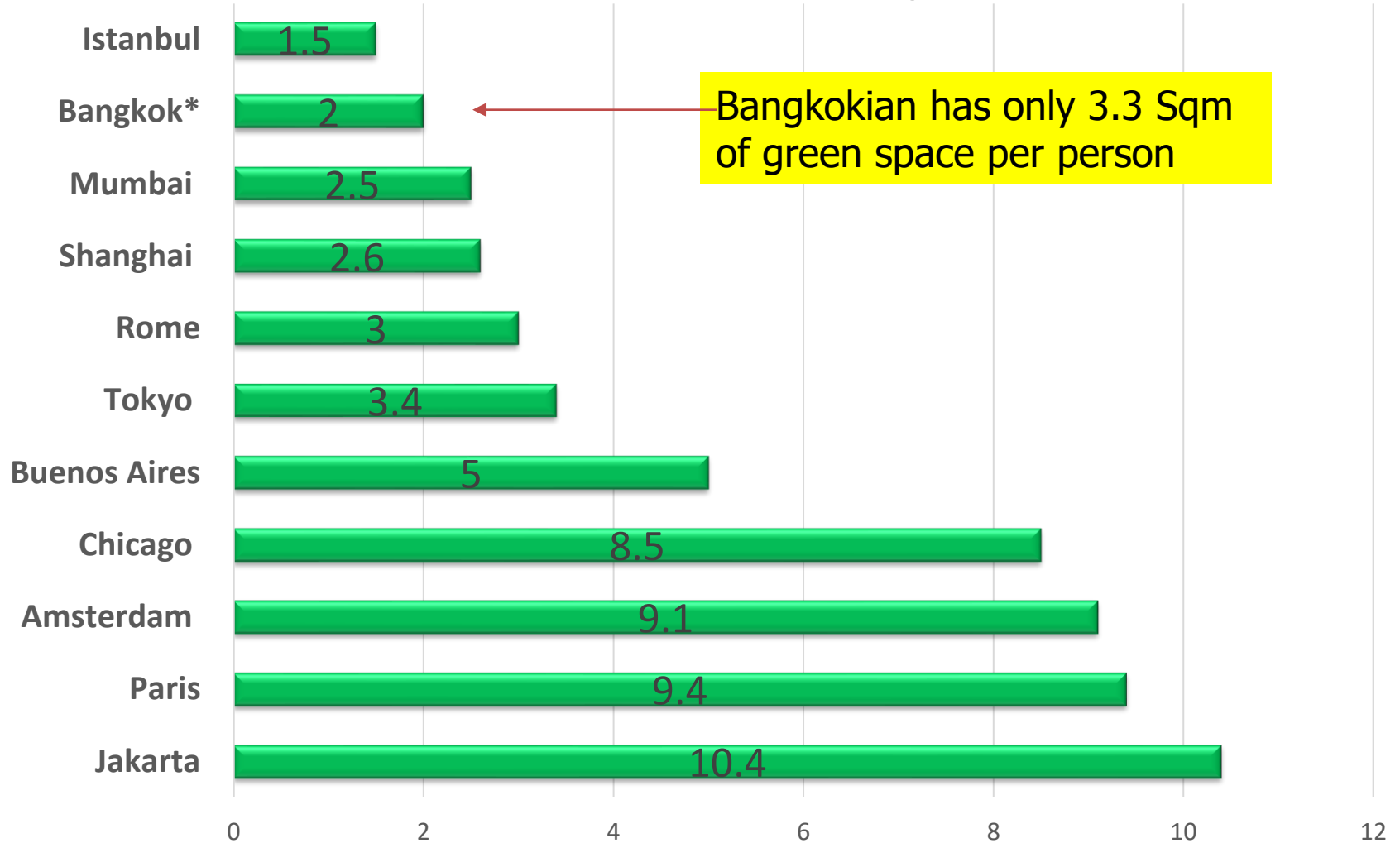


London's public green spaces represents 39 % of total area Bangkok?



Public Green Space (% total area)

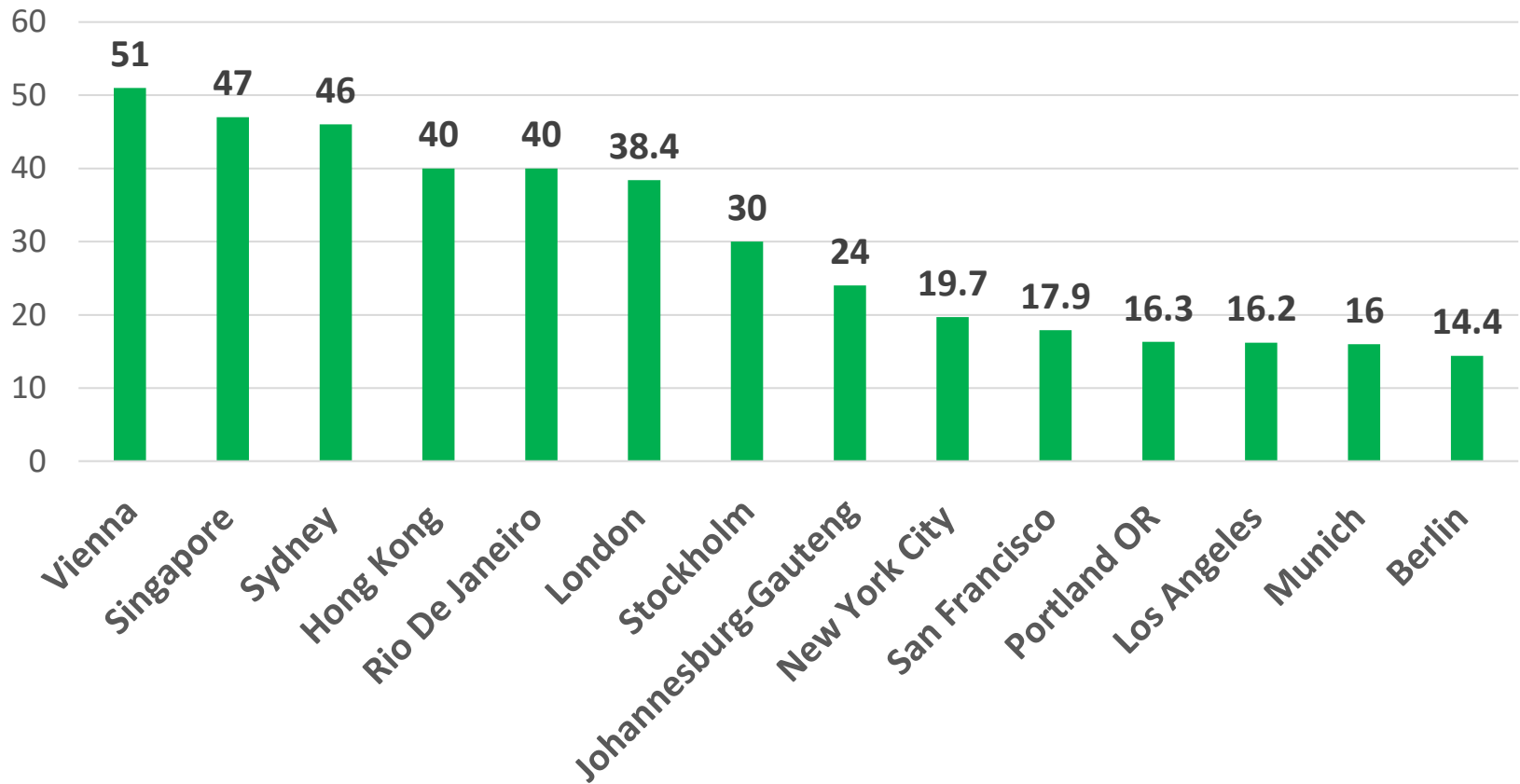
Source: World Culture Report



Percent of total area in the city

The world's greenest cities

Public Green Space (% total area)



2. Causes and consequences of excessive concentration in mega cities

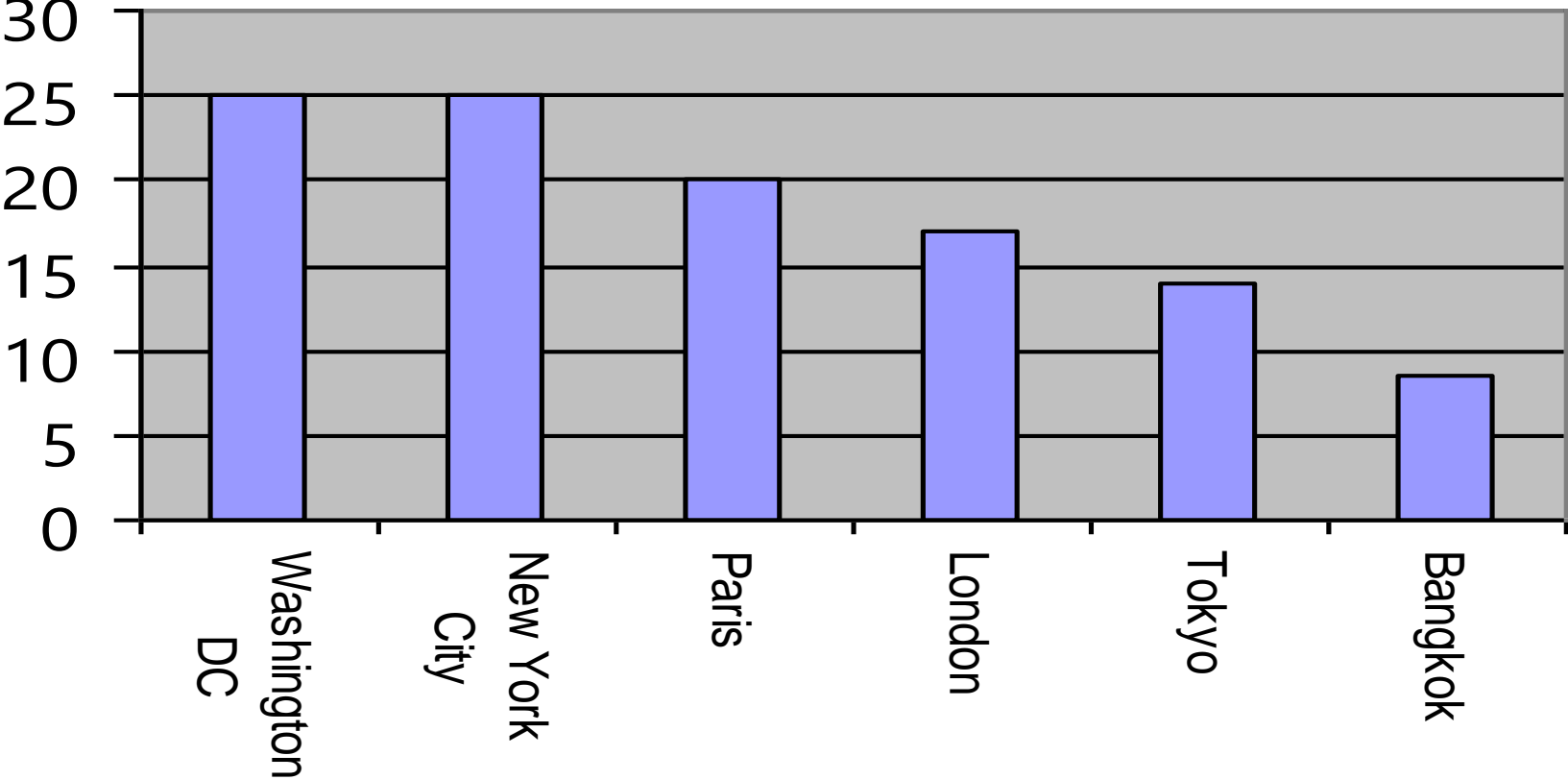
- Underdeveloped institutions for urban planning and management
- Inadequate human resources
- **Externalities of congestion and *pollution* are relatively underpriced** in megacities, encouraging overpopulation in larger cities.
- Excessive concentration significantly **reduces** economic growth.

Saturation (and other factors) is a cause of traffic jam

- Saturation happens when a **city's population grows faster than its infrastructure**.
- The most common form of traffic occurs when there are more cars than the roadway can support.
- This form of congestion is recurring, and makes up about half of all traffic.
- Because **sitting in highway traffic** is seen as an unproductive and undesirable activity, recurring congestion can have adverse effects on both the economy and citizens' well-being.
- If you spend 3 hours per day in the traffic, (1/8 of 24 hours), you would spend time on the road 5 years when you reach 60 years old.
- **Other factors** include construction, car crashes, road blocks, distracted driving, and floods (**Bangkok is sinking**).

Urban Road Area

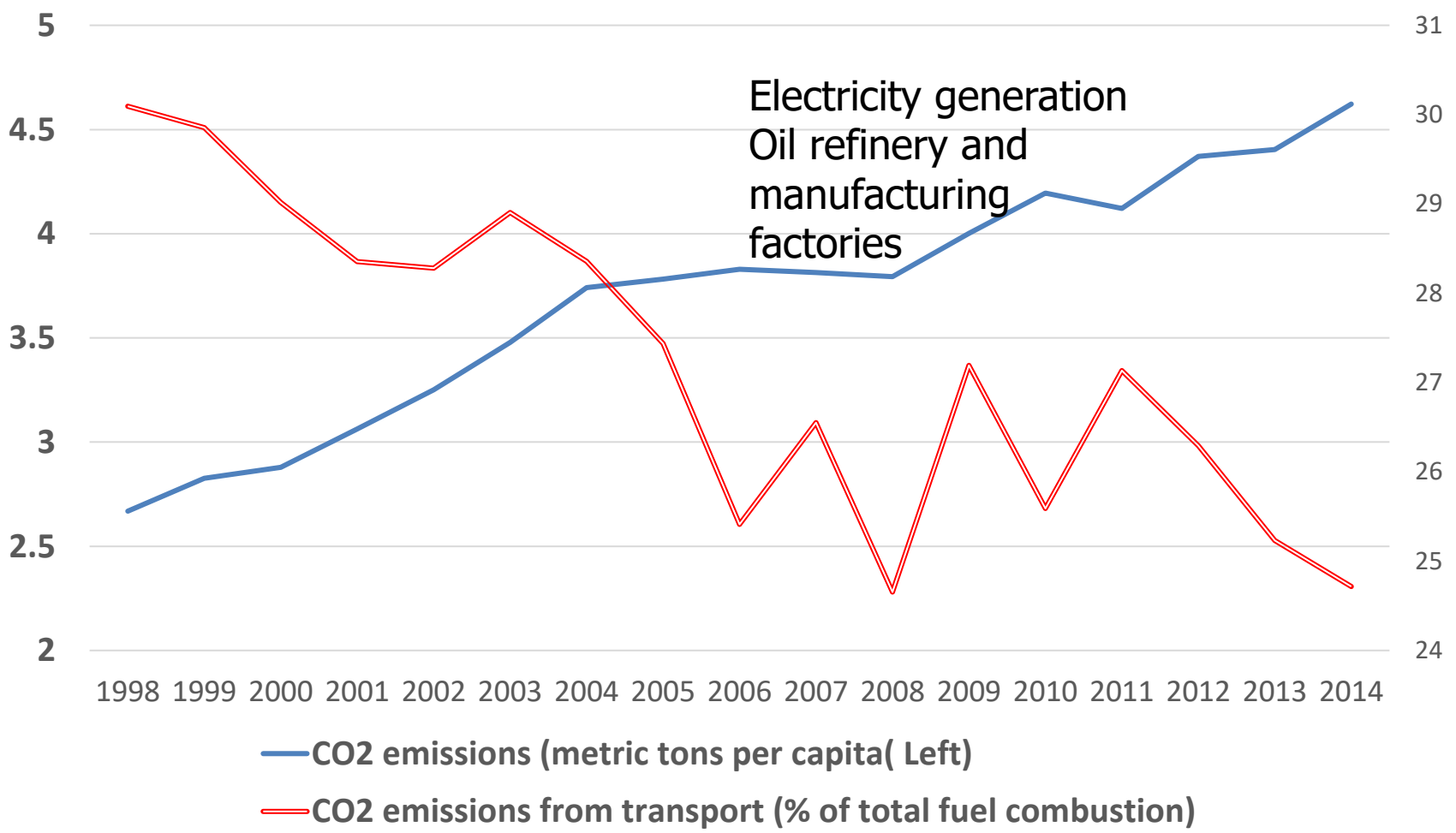
percent to total urban area



Consequences of traffic congestion

- Huge economic cost in terms of time lost and energy consumption and cost of health treatment
- Alarming levels of CO, black smoke, Hydrocarbon, noise level and *particulate matters* (PM) .
- Road traffic is responsible for 70% of the dust.
- The main sources of dust are diesel and motor cycle exhaust and construction sites.

Thailand's CO₂ emissions per capita (Rising) (declining as % from transportation source)



Further costs of excessive concentration

- Traffic accidents
- Poor air quality
- *Noise pollution*
- Health costs from exposure to high level of air and water pollution
- Contamination of ground water
- *Gastrointestinal and infectious diseases*
- Time lost due to long commutes

Extra travel time: 64 minutes per day

Source: Tom Tom Traffic index

- **Extra travel time** during *peak hours* vs. an hour of driving during a *free flow situation*.
- 64 minutes per day
- Multiply 64 by 230 days to annual figure of extra travel time of **244** hours per year

EXTRA TRAVEL TIME IN PEAK HOURS

Additional time spent in the car during peak hours



+ 24 min



















per 30 min trip
in the morning

+ 29 min

per 30 min trip
in the evening



World Rank in 2018

RANK BY FILTER	WORLD RANK	CITY	COUNTRY	CONGESTION LEVEL
1	1	Mumbai	 India	65% 
2	2	Bogota	 Colombia	63% 
3	3	Lima	 Peru	58% 
4	4	New Delhi	 India	58% 
5	5	Moscow region (oblast)	 Russia	56% 
6	6	Istanbul	 Turkey	53% 
7	7	Jakarta	 Indonesia	53% 
8	8	Bangkok	 Thailand	53% 
9	9	Mexico City	 Mexico	52% 



How to alleviate urban concentration

- ***Investment in interregional transport*** and telecommunications to facilitate de-concentration of industry.
- The government creates ***investment promotional zoning*** to attract investors to rural areas.
- ***Fiscal de-concentration***: small cities can raise fiscal resources and provide services need to compete with primate cities for industry and population.

Noise pollution may cause irrecoverable damage if louder than 85 decibel

- A normal conversation is about 60db
- **Maximum permissible** level of noise was at **70 decibel (db)**.
- Noise that is **Louder than 85db** may damage your ears.
- When exposing yourself to noise, think of three things: **How loud, how long, and how close?**
- Repeated exposure to **noise-emitting machines** and engines such as motorcycles (**big bikes**) can erode hearing more slowly but result in irrecoverable damaged ears.

As much as possible, avoid loud people

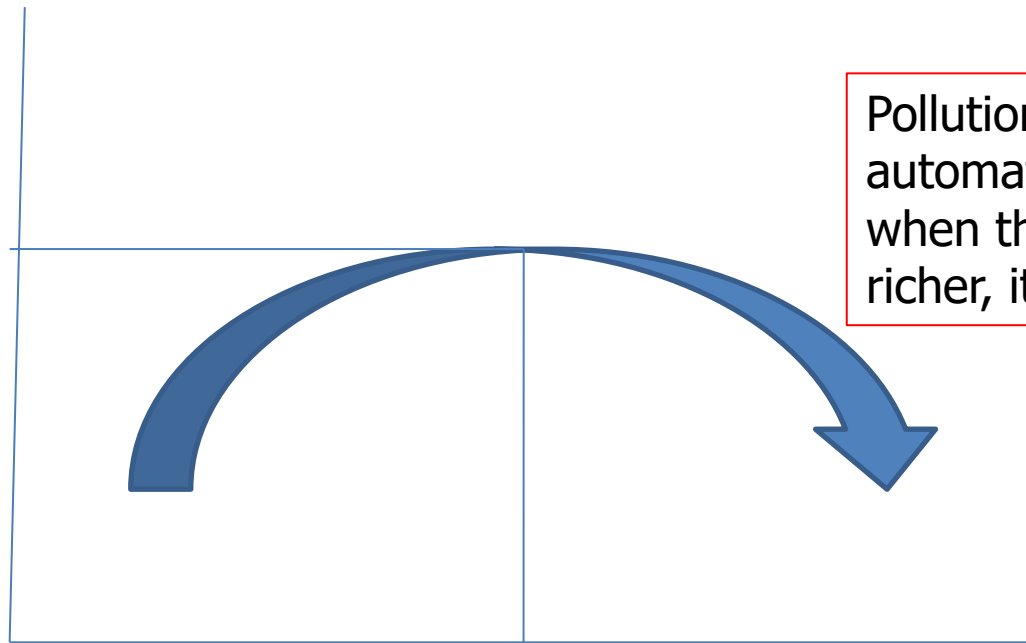
- Children become **aggressive** as their parents shout at one another.
- It inadvertently breeds a society full of *aggressive people* who cannot communicate with one another.
- Some even become suicidal, having suffered from persistent ringing in their ears.
- 21.4 % of Bangkok's population who lived along side the roads suffered from sensory neural **hearing loss**.
- Environmental noise pollution is a threat to health and well being.
- *Silence is the secret sauce of success*

3. Environmental Kuznets Curve (EKC)

- Environment quality declines as economic development has intensified up to a turning point, where the relationship between growth and pollution become delinked.
- Past the turning point, it appears that greater wealth increased environment quality
- Technology in advanced countries increases efficiency and reduce environment degradation.
- Wealth means you can afford EV and the government can enforce them (case of Singapore)

Environmental Kuznets Curve

Pollution level



Threshold level

Wealth

Environmental Quality and Wealth

- Environmental quality depends on population desire
- Rising wealth means environment is a luxury good for the well-to-do countries.
- EKC only observed in countries where there is less ability to hold polluters accountable.
- Wealth alone therefore is not enough for high environmental quality.
- It requires government's **willpower and the ability to hold polluters accountability.**

Particulate matter (PM 2.5)

- The effects of inhaling particulate matter: asthma, *lung cancer, cardiovascular disease, respiratory diseases, premature delivery, birth defects, and premature death.*
- The World Health Organization (WHO) estimated in 2005 that “Fine particulate air pollution less than 2.5 microns (PM_{2.5}), causes about 3% of mortality from cardiopulmonary disease, about 5% of *mortality from cancer of the trachea, bronchus, and lung*, and about 1% of mortality from acute respiratory infections in *children under 5 years*, worldwide.

Trapped pollutants

- Pollutants are pushed 20 km from the ground by hot air.
- During winter, high pressure air system produces the inversion layer preventing pollutants to float up so they are trapped and become more concentrated high above the ground.
- Pollutants from combustion gas mixing with sunlight turn into **ozone (O₃)** once PM_{2.5} exceeds 50 µg/m³ (microgram per cubic meter)

Dangerous O₃

- People who inhale ozone during repeated exposure may permanently damage their lungs or suffer from respiratory infections.
- Ozone exposure may reduce lung function or aggravate existing respiratory conditions such as asthma, emphysema or bronchitis. Ozone may also cause chest pain, coughing, throat irritation or congestion.

Urban heat dome

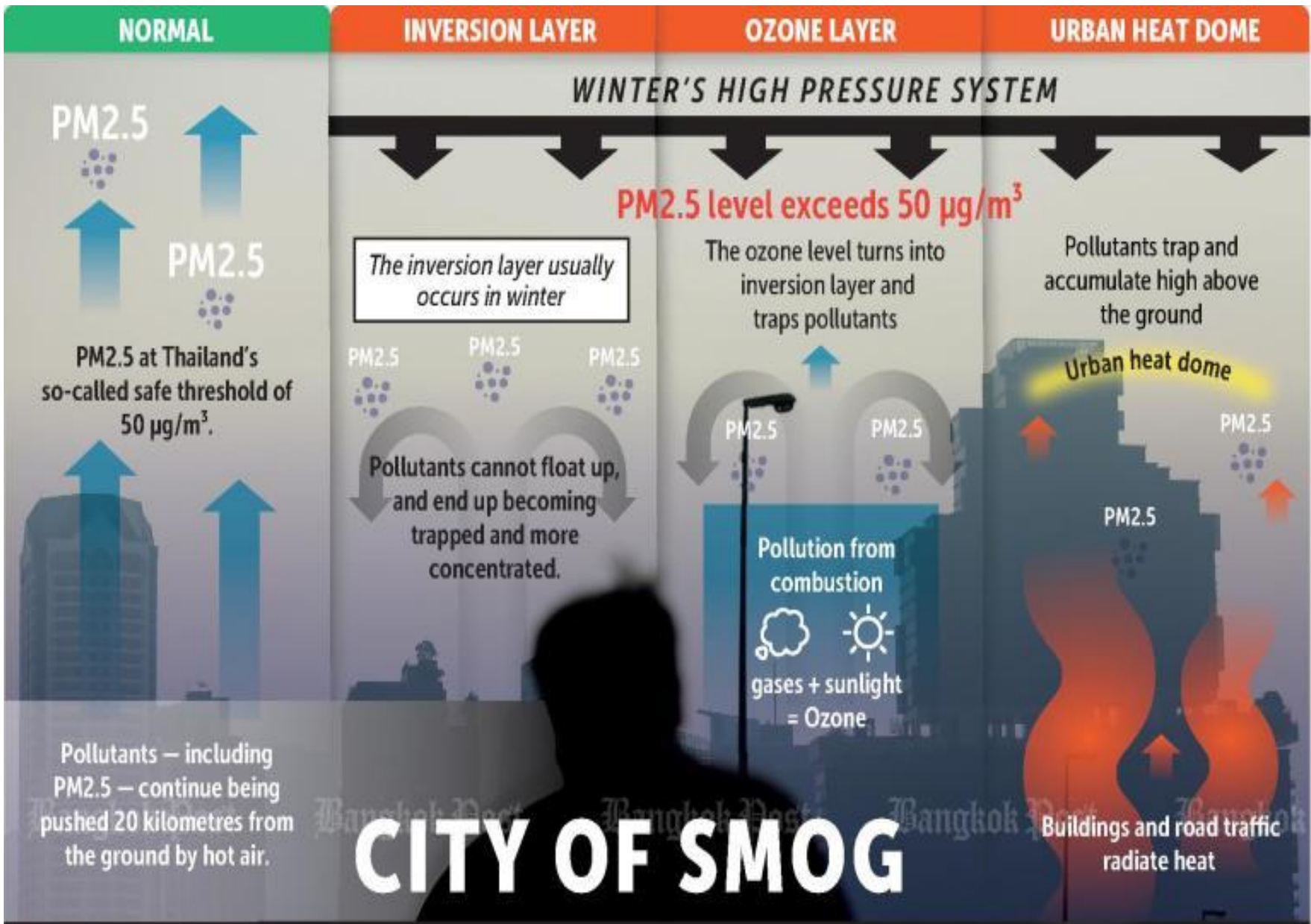
Rapid urbanization accelerates high rise buildings with glasses, metal, and concrete jungles in downtown areas.

Urban heat dome is created by buildings and road traffic radiating heat upward.

PM 2.5 must not exceed $50 \mu\text{g}/\text{m}^3$ (microgram per cubic meter) otherwise it creates ozone

The Ozone layer (shield)

- Ozone layer is in the earth's stratosphere at an altitude of 10 km containing a high concentration of ozone, which absorbs most of the ultraviolet radiation reaching the earth from the sun.
- The Ozone layer absorbs harmful radiations from the Sun, thereby reducing cancer and cataract risks, making life on Earth safe from hazardous cosmic rays.
- It exerts greenhouse effect, thereby enabling conservation of radiant energy from the Sun in the form of heat.
- The presence of Ozone in the Stratosphere is very essential to life on Earth.



The smog hanging over Bangkok in winter is the outcome of several factors, including winter's high-pressure system, which is an atmospheric layer of air that blocks pollutants from rising, the ozone layer and self-generating urban heat

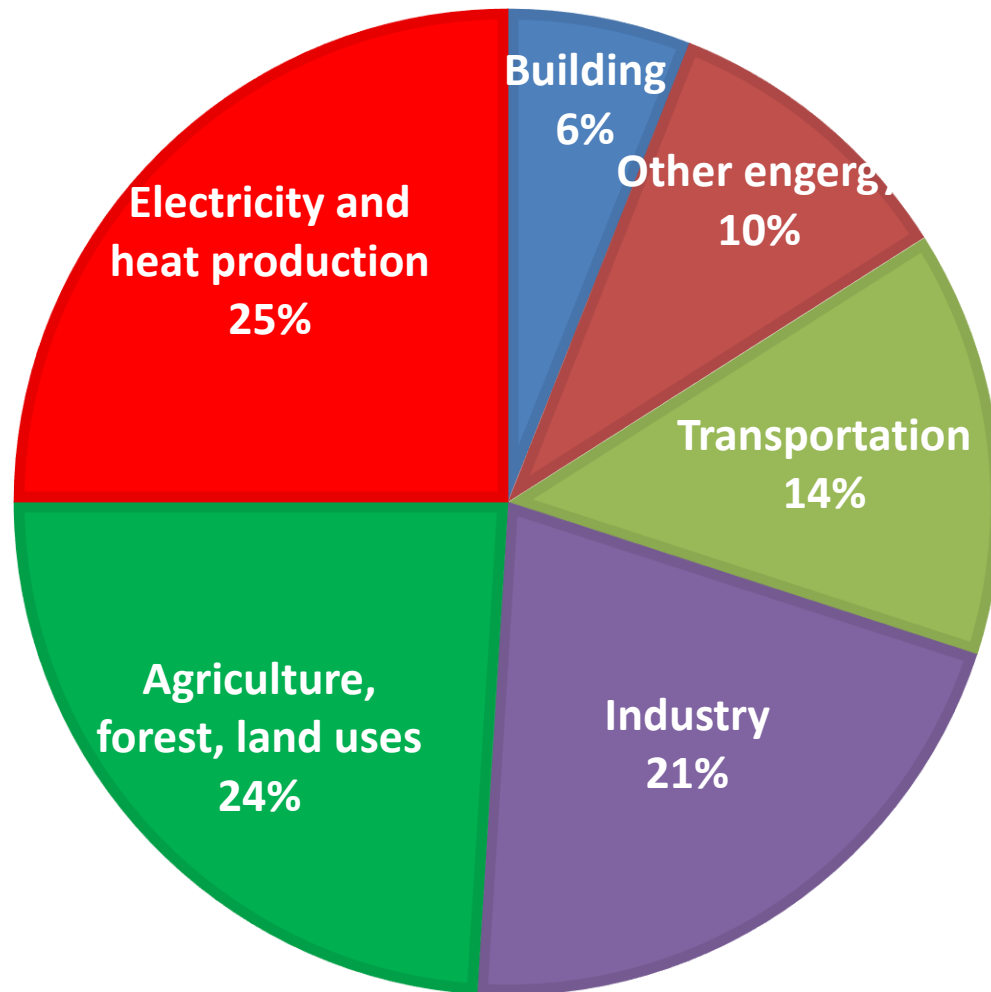
Unit: Microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$)

Only brief exposure of pollutants

- **Short-term exposure** at very high concentrations can significantly contribute to **heart disease**.
- **Traffic exhaust** is the single most serious preventable cause of **heart attack** in the general public, the cause of 7.4% of all attacks

Thailand's share of Green House Gas

SHARE OF GHG



More cars, more new roads, and more open-air crop burning

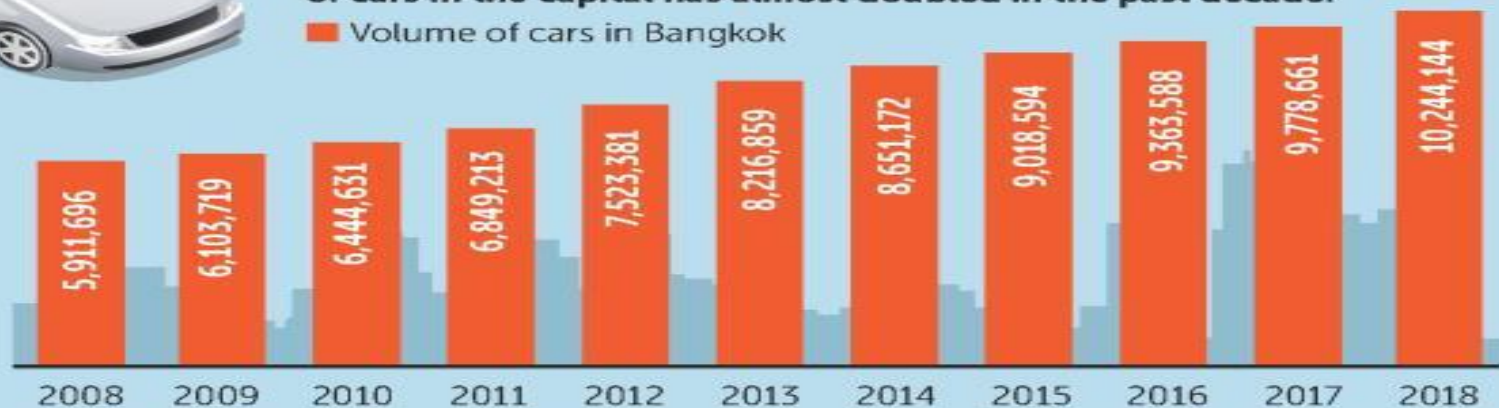
- Despite Bangkok's pollution and traffic challenges, the number of registered vehicles has more than doubled in the past decade to 10.5 million vehicles
- Transportation plans call for another 1,047 km of new roads and expressways over the next decade.
- Vehicles emitting dangerous black exhaust remain in widespread use.
- Moreover, despite anti-burning regulations, 66% of the sugarcane that entered mills this year was burned prior to harvesting.



THE AIR THAT YOU BREATHE

The government has tried to cut down on Bangkok's pollution by urging people to use public transport more often, yet the number of cars in the capital has almost doubled in the past decade.

Volume of cars in Bangkok

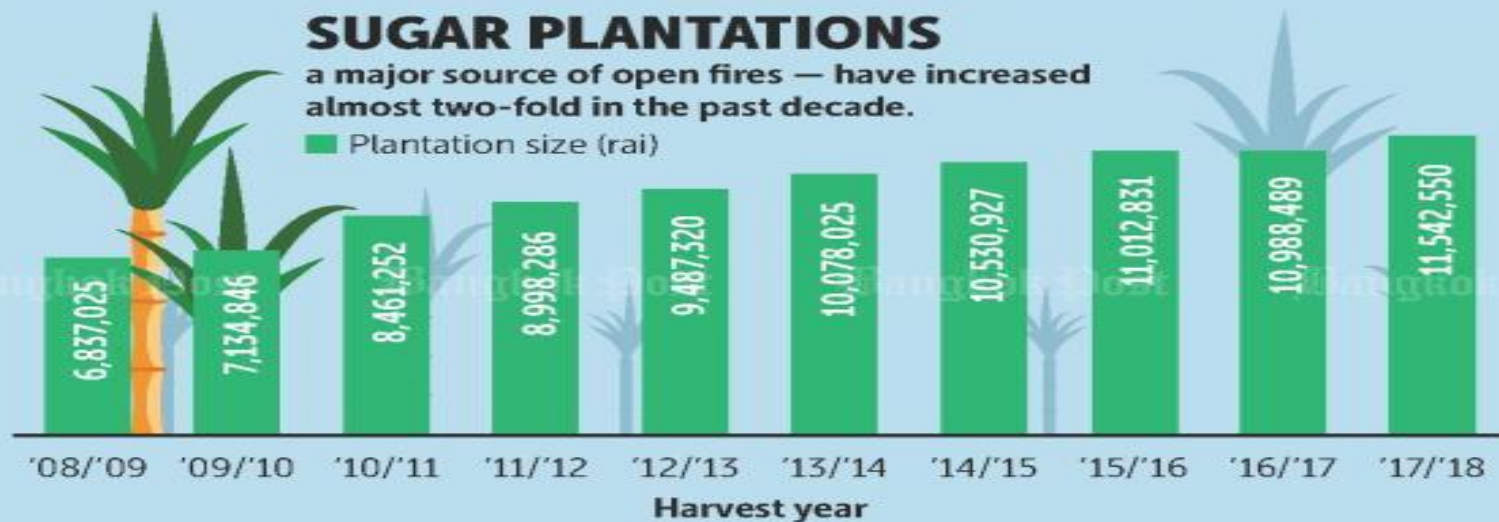


Source: Department of Land Transport

SUGAR PLANTATIONS

a major source of open fires — have increased almost two-fold in the past decade.

Plantation size (rai)



Source: Office of Cane and Sugar Board

BKPgraphics

The myth of the Kuznets Environmental Curve

- When we talk about economic growth, it usually means more pressure on the environment and more use of natural resources,
- But it doesn't have to be that way, as China's success stories show.
- China can change the environment by using innovation and decouple economic growth from resource use and environmental degradation.
- In other words, there can be zero trade off between growth and pollution.

Conclusion

- There is a stylized fact of urbanization process in developed and developing countries: urbanization speed is faster over time.
- Bangkok primacy has been declining, as the second stage of de-concentration is taking place.
- But Bangkok is still a far cry from being a city offering high quality of life because of environmental degradation.
- The target of not letting global warming exceed 2°C above pre-industrial levels is unlikely to achieve.

Review questions

- Compare and contrast urbanization in Thailand and Africa.
- Provide evidence indicating the sustainability of urbanization process in Thailand.
- What can the public sector do to ease the adverse consequences of urbanization?
- Why has urbanization in Thailand been **slowing down** in all regions?
- “All happy families resemble one another, but each unhappy family is unhappy in its own way” *Anna Karenina* by Leo Tolstoy. Do you think that happy families in Buri Rum and Bangkok resemble one another, but differ when they are unhappy?

George W. Bush, on returning to Yale to accept an honorary degree (The Sunday Times, May 2001)

“To those of you who received honors, awards and distinctions, I say well done. And to the C students, I say, you too can be president of the United States”

Robert Frost: The road less traveled

**I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I,
I took the one less traveled by,
And that has made all the difference.**

Mr. Bhanupong

**I shall be telling you this with a sigh
For forty years, my students have gone by
Some excelled, some did not do so well,
Because of their passion and perseverance
And that has made all the difference.**