

Panel 3A

# Taking action on energy efficient cities: The Mexico case

International Conference on Energy Efficiency in Cities

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# Energy efficiency in cities

## Introduction

### Three basic ideas

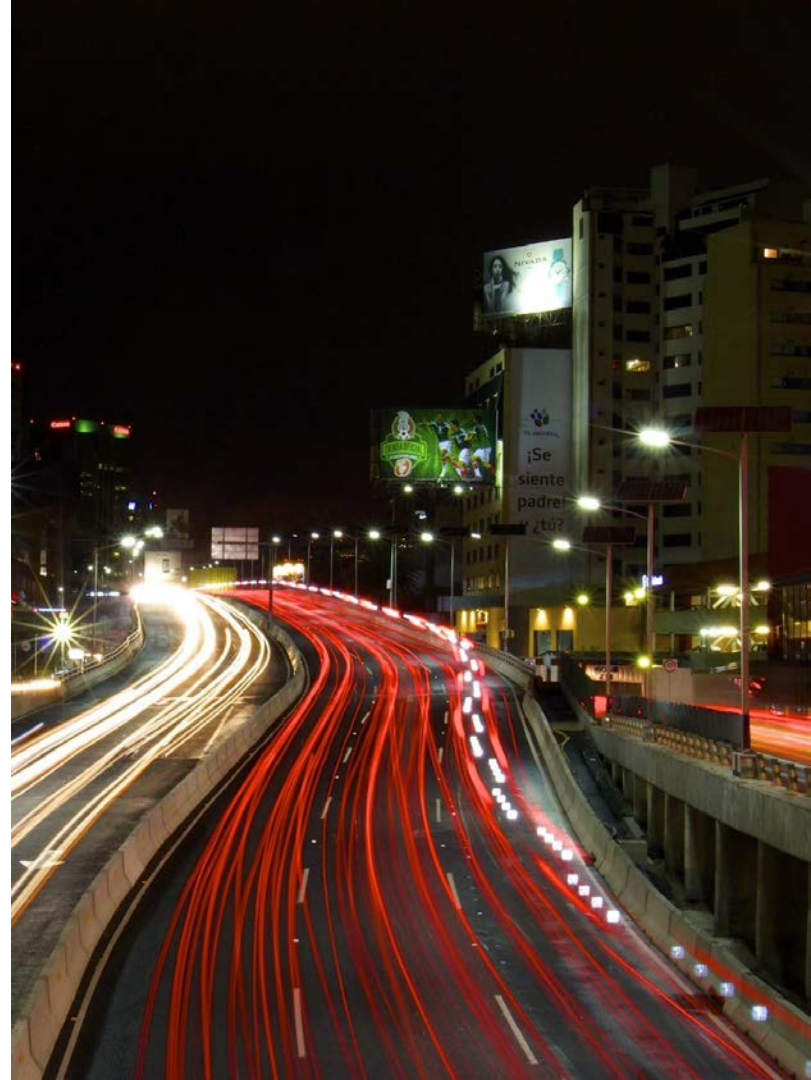
1. Cities are responsible for approximately **75% of global primary energy consumption<sup>1</sup>**, and 68% of Mexican total energy consumption<sup>2</sup>.
2. By 2030, urban population in Mexico will increase in 17 million inhabitants, which means **72% of total growth will occur in cities.<sup>3</sup>**
3. Understanding energy consumption in cities is fundamental to propose **energy efficiency** global solutions.

<sup>1</sup> UN-Habitat: Energy (2015)

<sup>2</sup> CMM based on the National Energy Balance 2014, DENUÉ 2014, and Pemex Sales Report 2014.

<sup>3</sup> In Metropolitan Zones, for the period between 2010-2030, information from Urban National System 2012.

Secretariat of Social Development, 2012.



# Energy efficiency in cities

## Introduction

Additionally, energy consumption relates directly to:

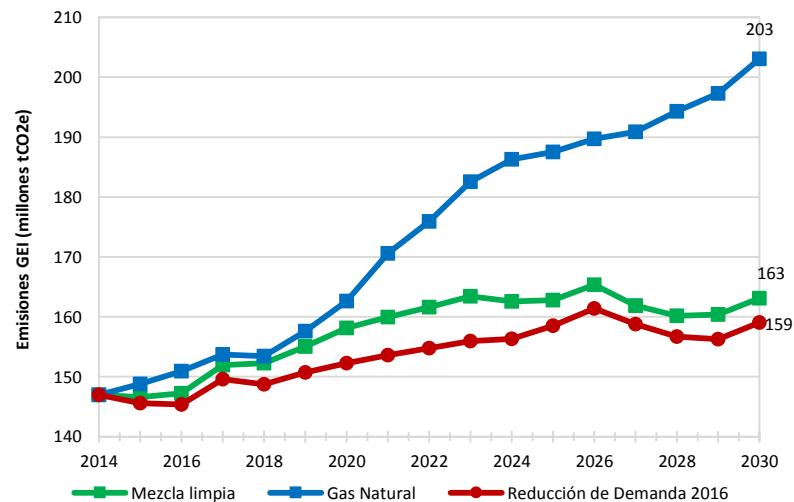
- economic development
- Greenhouse gas (GHG) emissions
- energy generation solutions

Through the implementation of an ambitious energy efficiency target (10% improvement in energy efficiency by 2030), it would be possible to achieve the clean energy targets set in the Energy Transition Law<sup>1</sup> at a much lower cost (about 1,680 million USD below) than a clean energy mix scenario.

GHG emissions would also be the lowest.

<sup>1</sup>Renewable energy prospects 2014-2018. SENER, 2013.

<sup>2</sup>Binding Goals for the Incorporation of Clean Energy in the Mexican Electric Generation. CMM, 2015.

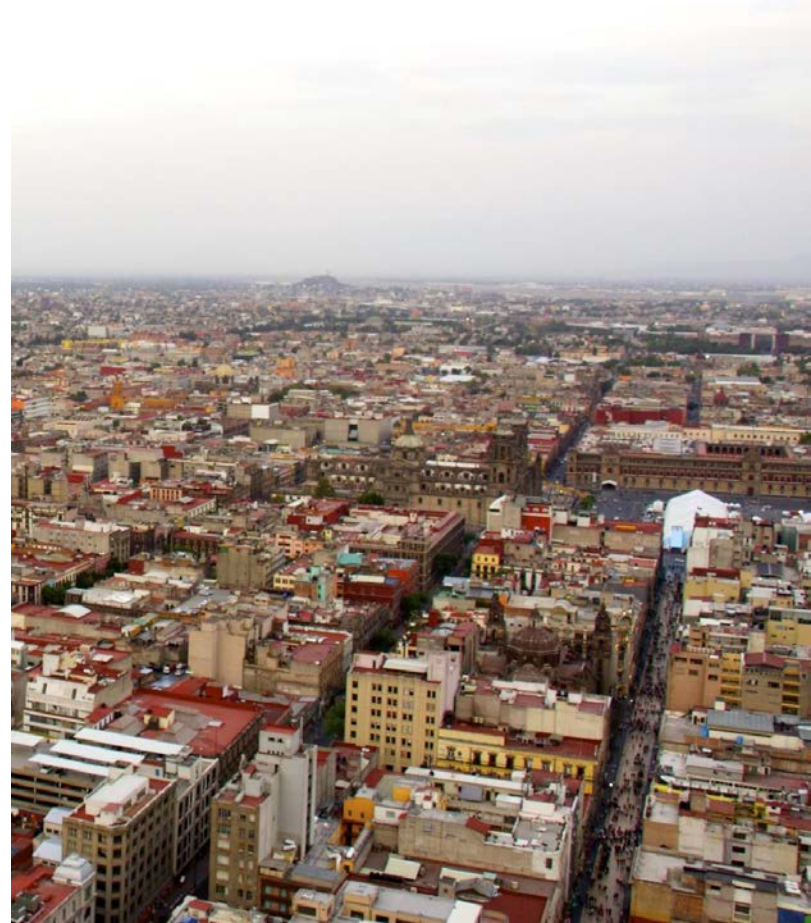


# Energy efficiency in cities

## Direct solutions

There are **direct** solutions, such as:

- public lighting
- water pumping
- automobile fleet renewal
- the 4 “smarts”
  - Smart grids
  - Smart appliances
  - Smart buildings
  - Smart meters



# Energy efficiency in cities

## Indirect solutions

There are also **indirect** solutions which are just as important, since they are **instruments that change consumption patterns**.

- Economic instruments
  - Taxes
  - Subsidies
  - Charges/discounts
- Standards and regulations
- Public engagement
- **Urban Planning Instruments\***



# Energy efficiency in cities

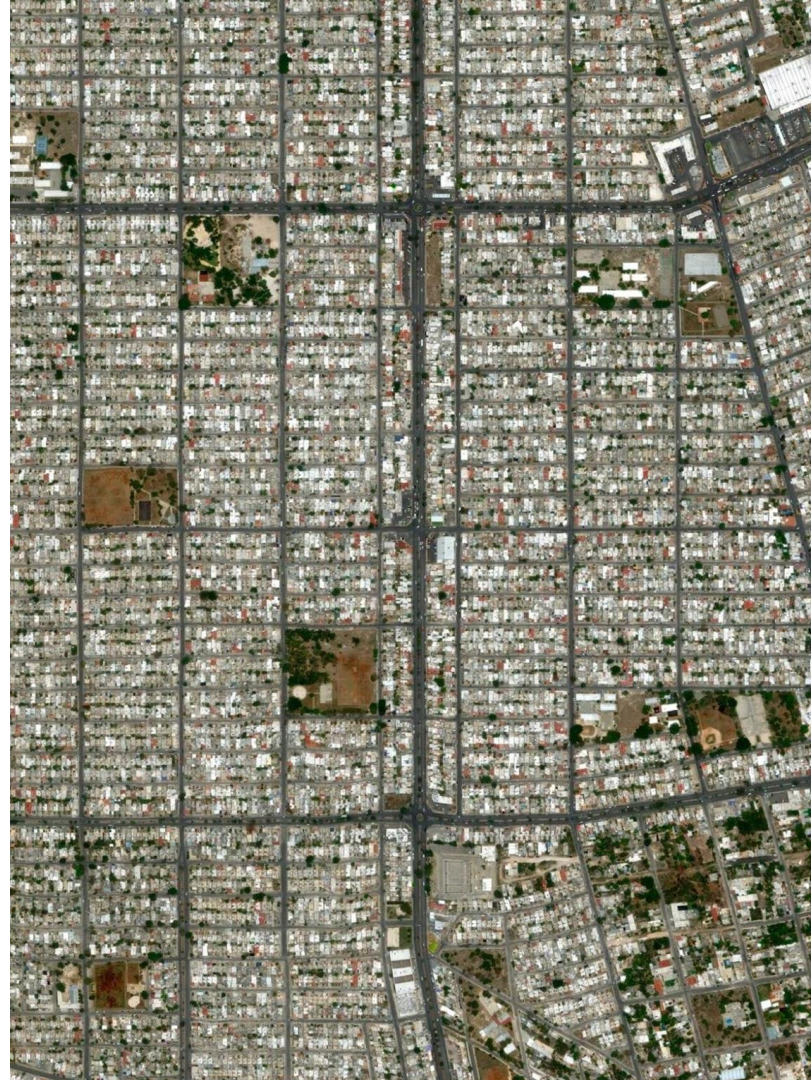
## Urban planning and energy

- In Latin America, **2.5 new vehicles for each birth** were registered in 2010.<sup>1</sup>
- In Mexico, between 1980-2010 urban footprint grew **3.5 times faster** than the population growth.<sup>2</sup>
- In Mexico, **25% of families' income** is destined for transportation.<sup>3</sup>

<sup>1</sup>Hidalgo, D., & Huizenga, C. (2013)

<sup>2</sup>The expansion of the cities 1980-2010. Secretariat of Social Development, 2012.

<sup>3</sup>Urban Reform: A hundred ideas for Mexican cities. CMM-CTS-IMCO, 2012.



**How much energy can be saved by  
changing urban development patterns?**

# Energy efficiency in cities

## Challenges

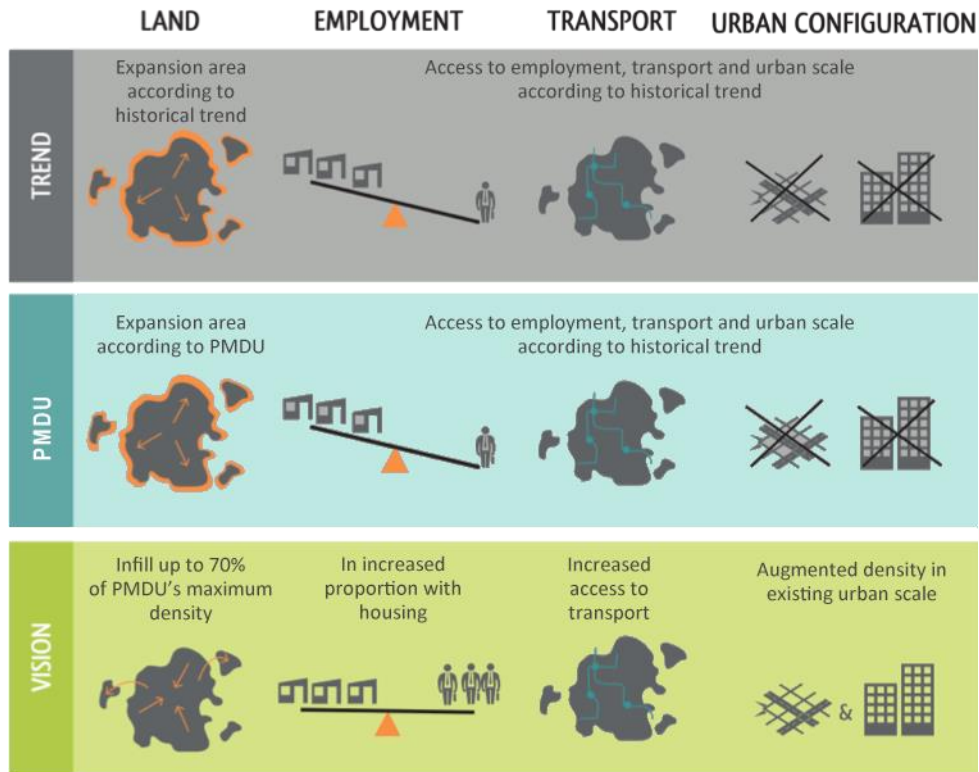
1. There is **no official data** about energy consumption in Mexican cities.
2. During 2015, the CMM gathered information on urban planning instruments of **37 metropolitan zones** (12 months to gather and process urban information of 367 municipalities). **Only 10% of the instruments contribute to the development of compact cities.**

<sup>1</sup> Metropolitan Profile: Growth scenarios and urban carrying capacity of 59 metropolitan zones. CMM, 2016.



Construyendo Líderes en Planeación de la Movilidad Urbana, Lima 2016, CTS  
Embarq





# Energy efficiency in cities

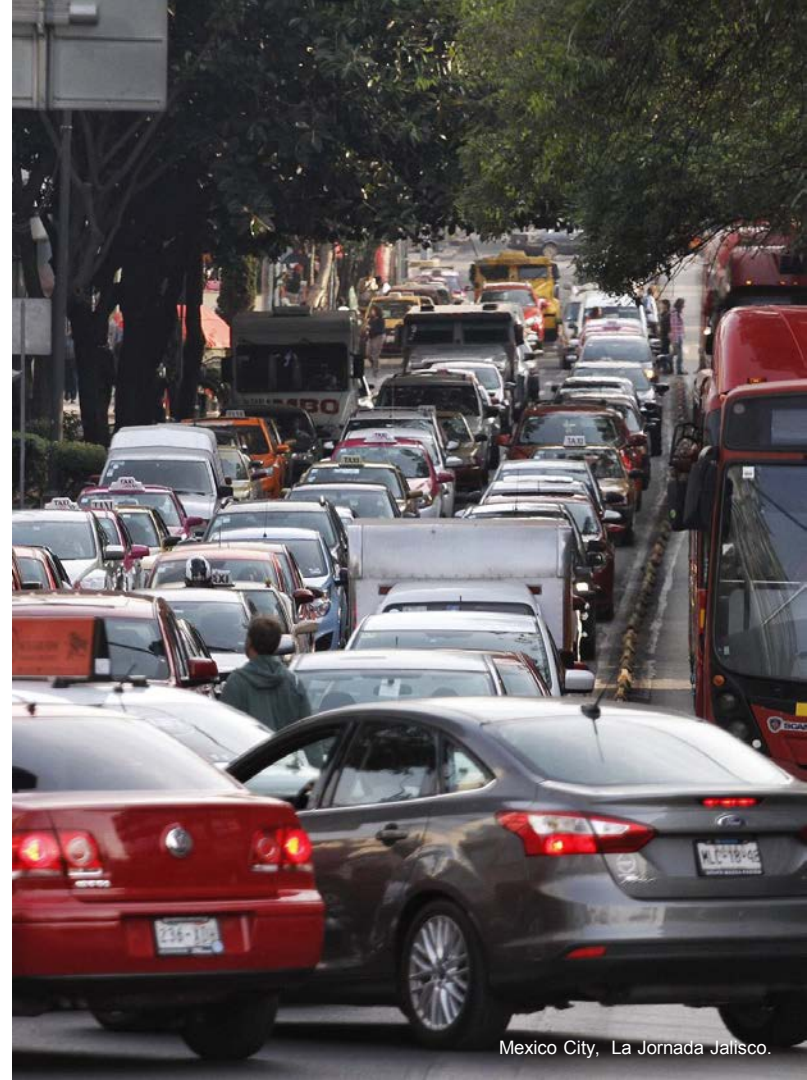
## The compact city and energy efficiency

### Transport

Compact cities have a direct impact on travel behavior, when compared to sprawling cities they:

- Reduce by 13% vehicle kilometers traveled annually<sup>1</sup>
- Decrease by ½ hour the average daily trip duration<sup>1</sup>
- Mode share tends to have a higher proportion of transit trips over auto trips<sup>1</sup>
- Reduce by at least 13% the energy required for transportation

<sup>1</sup> Urban Planning modeling scenarios: Mexico City Metropolitan Area. CMM, 2015.



Mexico City, La Jornada Jalisco.

# Energy efficiency in cities

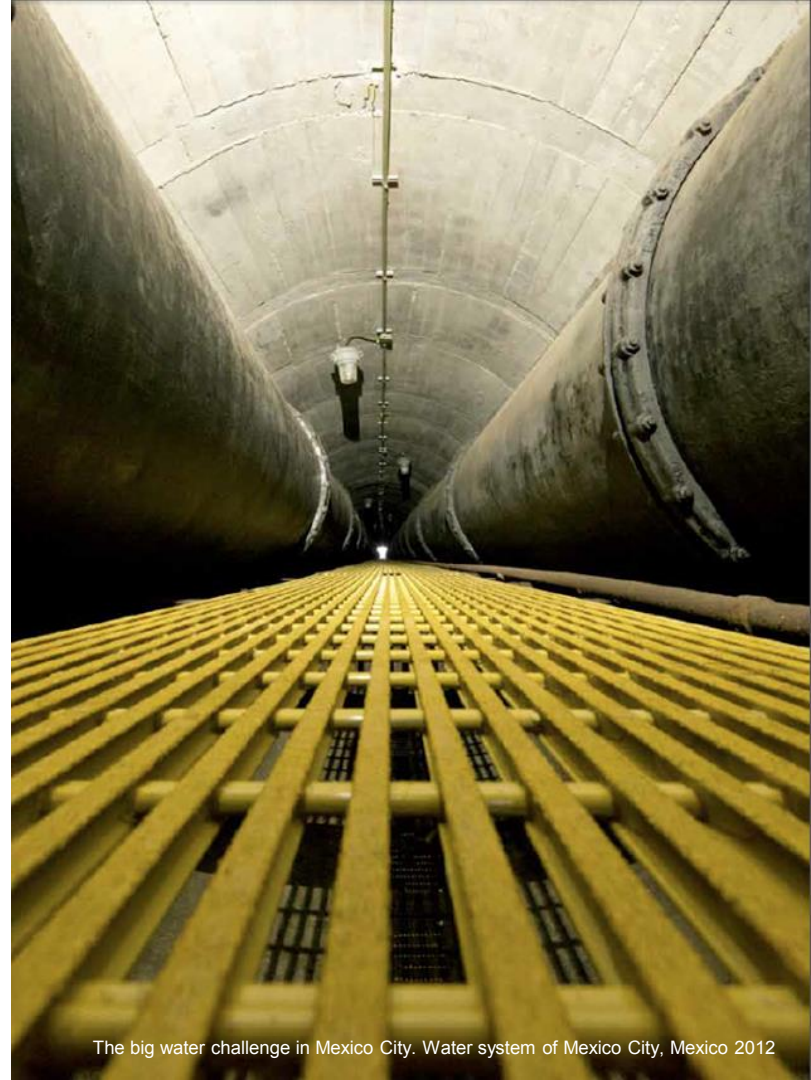
## The compact city and energy efficiency

### Water distribution

In compact cities there is less water leakage per km in the distribution network.

Mexico City could **save up to 27% of the energy used for water distribution** if it grows in a compact way instead of BAU. <sup>1</sup>

<sup>1</sup> Metropolitan Profile: Growth scenarios and urban carrying capacity of 59 metropolitan zones. CMM, 2016.



The big water challenge in Mexico City. Water system of Mexico City, Mexico 2012

# Energy efficiency in cities

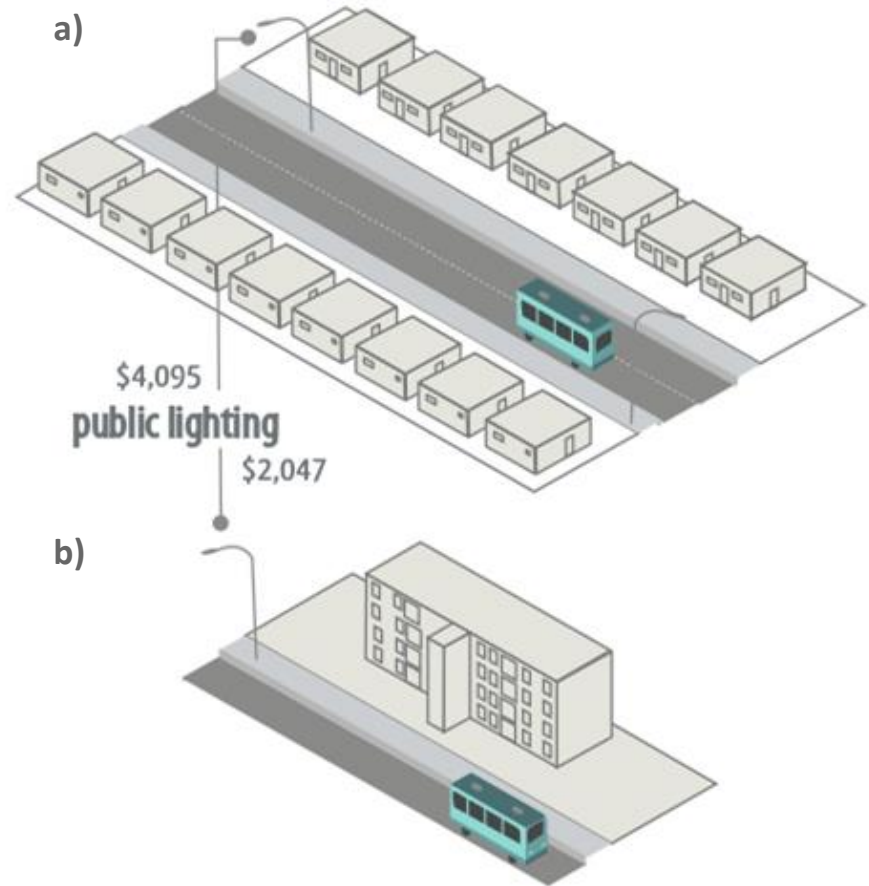
## The compact city and energy efficiency

### Public lighting

- Due to less urban surface, the number of lamp posts decreases and hence the annual spending in electricity consumption halves.

The figure compares two development models, both compiling 16 dwellings, and the same amount of public space. Model b) implies:

- Illumination carbon footprint would be 2.3 times smaller<sup>1</sup>
- Total energy consumed for public lighting would decrease by 43%<sup>1</sup>



<sup>1</sup> Sustainable Housing: Location as a strategic factor. CMM, 2014.

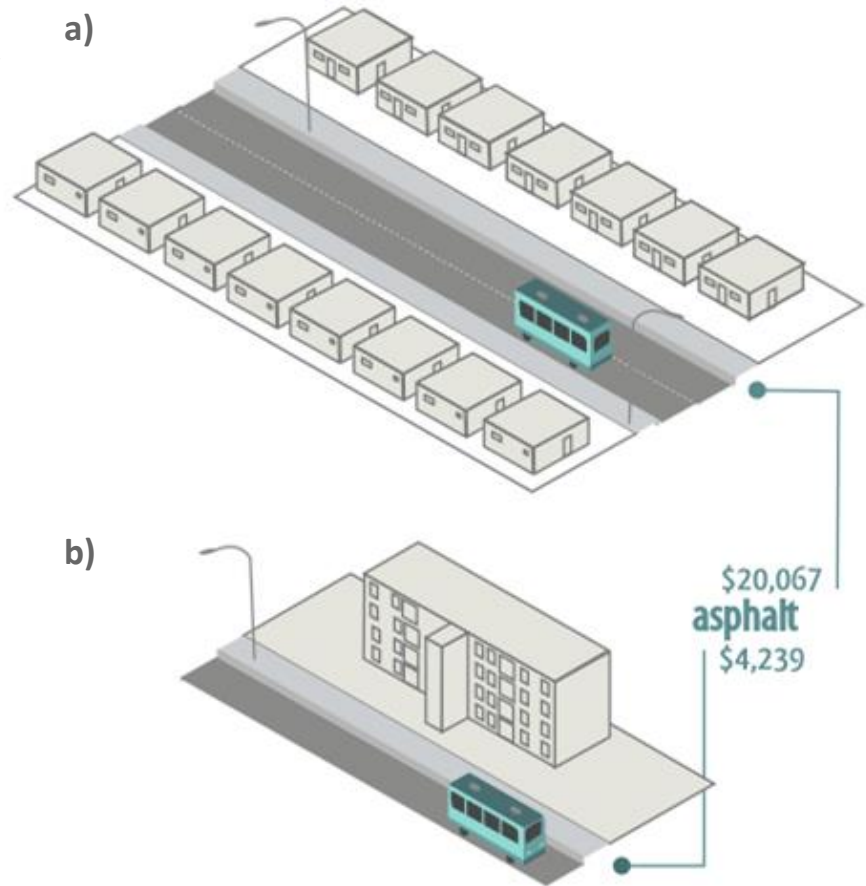
# Energy efficiency in cities

## The compact city and energy efficiency

### Embodied energy in building materials

The compact city requires less materials

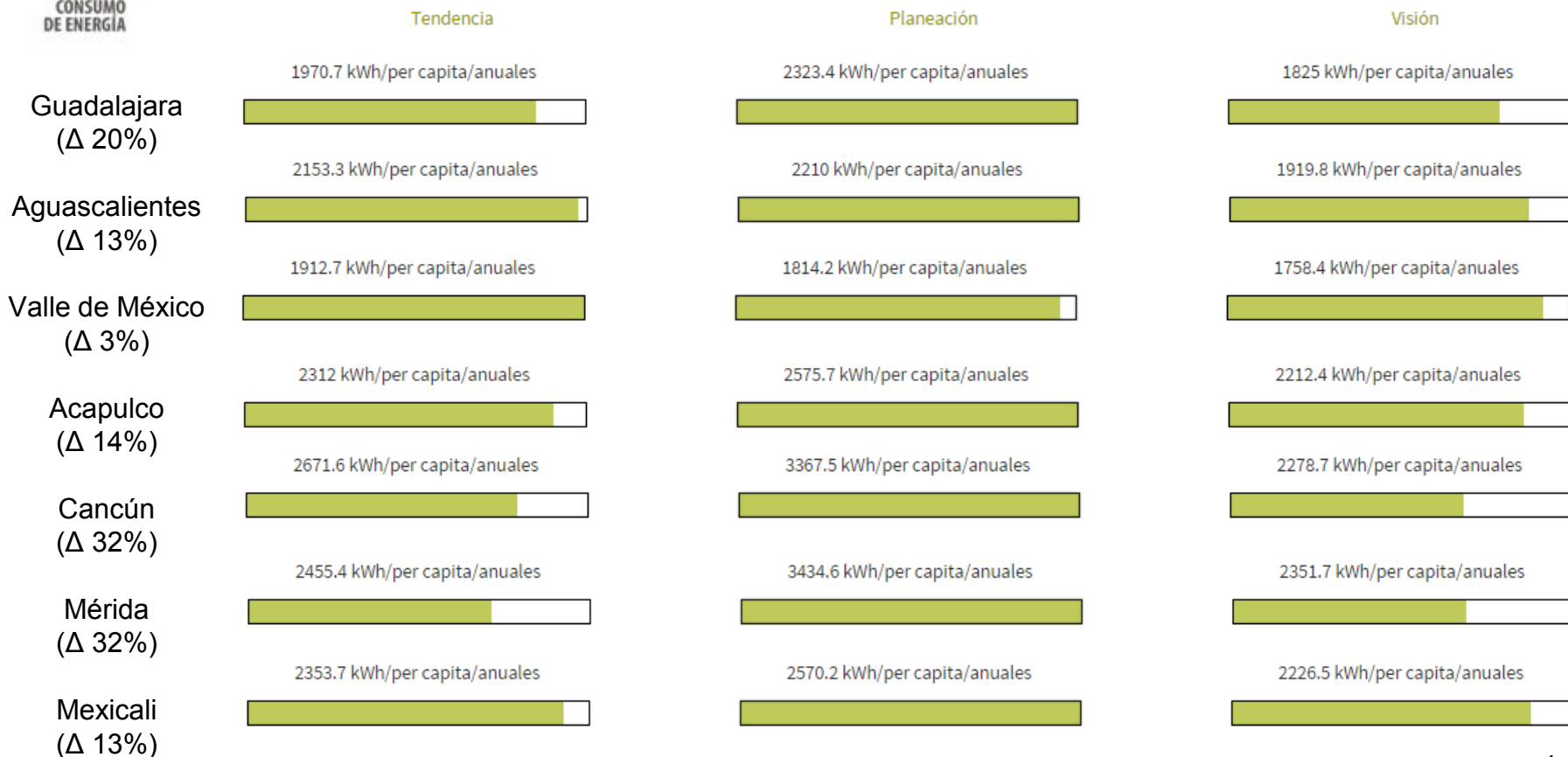
- Model b) consumes 22% less primary energy for urbanization and construction of the 16 dwellings and open spaces<sup>1</sup>
- A local government in model b) spends 79% less in asphalt pavement's maintenance than in model a)<sup>1</sup>



<sup>1</sup> Sustainable Housing: Location as a strategic factor. CMM, 2014.



# Energy consumption in transport, public lighting and water pumping



# Energy efficiency in cities

## Specific recommendations

### Urban Planning Policies

- Urban planning based on minimum density requirements, access to transport, employment-housing balance, land mixed uses and mixed income level
- Standardize the methodology to design the Municipal Urban Development Programs (PMDU). Build the required capabilities
- Land reuse and transformation through land merge or regrouping (reagrupamiento parcelario), public-private investments, etc.
- Specific intervention areas (polígonos de actuación) to secure minimum social housing percentage, mix use requirements, etc.

# Energy efficiency in cities

## Specific recommendations

### Economic Instruments

- Low-income housing subsidies based on location
- Enhance the Urban Contention Poligons (Polígonos de Contención Urbana) with parameters related to density, scale, employment-housing balance, and access to public transport and local services

### Fiscal Instruments

- Incremental land taxes in vacant land in consolidated areas of the city to avoid speculation
- Added property value tax (impuesto a la plusvalía) or betterment levies (contribuciones de mejoras) to invest in underdeveloped areas of the city (cross subsidies)



# Energy efficiency in cities

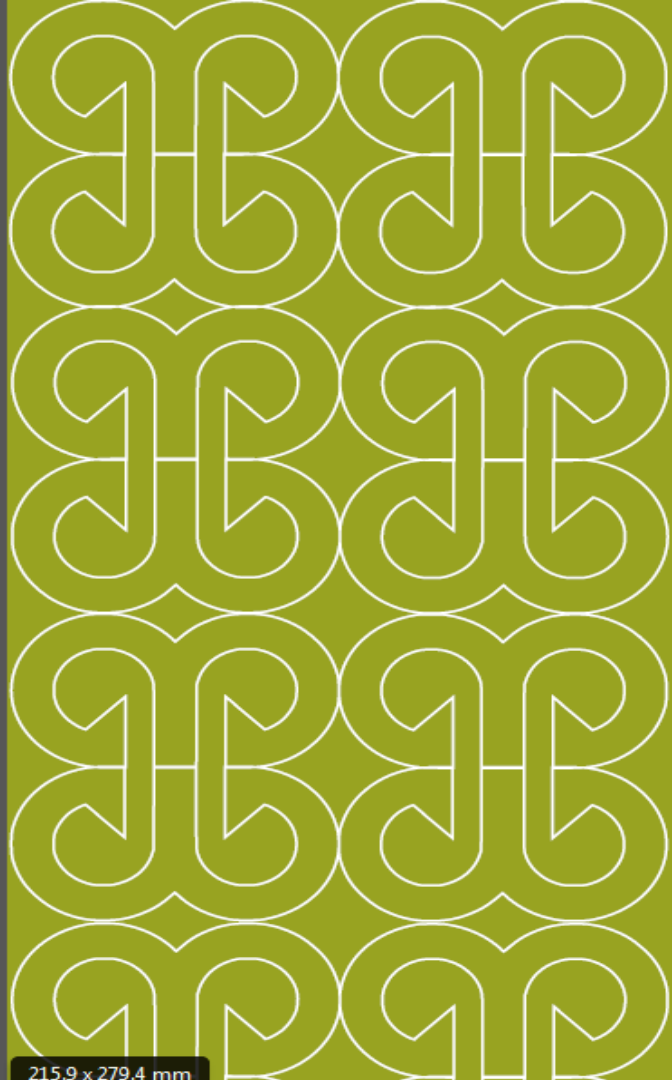
## Specific recommendations

### Governance and Norms

- Update the Urban Development Act to recognize the figure of metropolitan areas and align local planning to metropolitan planning
- Standard Mexican Norm on transportation planning and operation (schedules, tariffs, modal connectivity, etc.)

### Information systems

- Detailed electric and gas metering by AGEB (Área Geoestadística Base) and tariff
- Bind access to the Metropolitan Fund with the existence of an urban transport information system (transport types, schedules and frequencies)



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