

REPUBLIC OF SOUTH AFRICA

1. Energy use and potential in urban systems



IEA 2019. All rights reserved.

1. Energy use and potential in urban systems

Scenario: Your mayor/governor is under pressure to reduce energy consumption

Question: How do you help the mayor/governor understand the drivers of energy consumption in the city?



Training Overview

1. Why is urban energy use important?

- Urbanisation and energy use
- Impacts of energy use in urban areas

2. What's the potential for energy efficiency in cities?

• Technologies and solutions that allow higher efficiency

3. Activity: mapping of urban authority influence



- This session gives a broad overview of why energy use in urban systems is relevant (concentration of energy-consuming economic activities, and the increasing urbanisation)
- The impacts of these activities are laid out as well (energy use, emissions, urban heat island).
 We do this to call attention to the scale of the impacts and the need to act.
- Then we elaborate the drivers responsible for these changes. We do this to highlight the aspects that can be controlled / regulated by policy.

- The aim of the activity towards the end is to:
 - Get a sense of the level of authority and influence of participants over the energyconsumption
 - To allow the participants to understand their sphere of influence and which stakeholders to contact in areas where influence is insufficienct
- The **following sessions** will then cover the specifics of how each subsystem of the city/municipality consumes energy, analysing the drivers, and the recommendations to control them.





Urban areas account for the greatest shares of both **global population** and world **economic activity**, two **key drivers of energy use**.

As such, the world's urban areas have substantial influence over **global energy** demand and energy-related emissions



Where to start?

Tools

What are the steps?

Urban areas are growing, especially in emerging economies

Projected percentage of global urban population 1950-2050



Percentage of urban dwellers per region, 2018





Where to start?

Tools

What are the steps?

Role of urban authorities: A few of the main responsibilities of cities/municipalities are...





Where to start?

ools

What are the steps?

... and they involve energy-consuming sectors below in one way or another



Buildings

Public administration buildings, retail and residential buildings, schools, hospitals, museums, social housing



Transport

Public transport, street design, traffic signals and signage



Utilities

Lighting, water, sewerage, local energy and communication networks



Waste

Landfilling, waste management



Where to start? Tools What are the steps?

What happens in urban areas: Majority of global energy use and greenhouse emissions comes from cities





Source Energy Technology Perspectives 2016

Why is urban energy use important? Impacts

Where to start?

Tools

What are the steps?

What happens in urban areas: Urban structures produce heat island effect, which exacerbates need for cooling





Why is urban energy use important? Impacts

Where to start?

What are the steps

What happens in urban areas: Local air quality is also worse in urban areas, exceeding WHO guidelines of 20 µg/m3, due to externalities of energy use





What drives energy use in urban areas?



Where to start?

Tools

What are the steps?













Source IEA ETP 2016



Why is urban energy use important? Opportunity



Fortunately, the majority of opportunities to reduce energy use and emissions are also in urban areas





• URBAN PLANNING and TRANSPORT: Potential for obtaining lower emissions and energy use based on planning design, influencing transport

Carbon footprints (residential emissions) in different neighbourhoods in Toronto, Canada



East York - 1.31 tCO2e/cap (residential only)



Etobicoke - 6.62 tCO2e/cap (residential only)

High-density apartment complexes within walking distance to a shopping center and public transit: 1,31 tCO2e/capita High-density single family homes close to the city center and accessible by public transit: 6.62 tCO2e/capita



Whitby 13.02 tCO2e/cap (residential only)

Suburbs with large, lowdensity single family homes that are distant from commercial activity and public transit:

13,02 tCO2e/capita





Total CO₂ emissions in Southeast Asian cities in Business-as-Usual (BAU) and Improved Land Use and Transport (LUT) scenarios



Improving land use and transport could reduce 50% of global CO₂ emissions. In Southeast Asia, reduction could be between 58% to 93%



Electricity savings from higher efficiency motors in different sizes and motor-driven applications



Savings based on the sizes of the motors and hours of operation could go up to 1500 GWhr/yr





Energy savings from replacement of the different existing lighting technology stock in India

Energy saved from replaced stock

• % savings

Average energy savings from replacing existing stock of public lighting technologies in India could reach as high as 1600 GW, and 82% in terms of percentage savings



Energy savings achievable upon implementation of the Energy Conservation Building Code in the city of Jaipur



5-YEAR ENERGY SAVINGS POTENTIAL DUE TO ECBC (JAIPUR)

Municipalities in India implementing building codes can expect to gain high savings from private buildings, as well as high percentage savings from their own municipal buildings

https://www.wri.org/blog/2017/11/indias-more-make-buildings-efficien Republic or South Arrica

Source https://doi.org/10.1016/jenburg/2012.11.015

City carbon future modelling (Cape Town) showing the impact of different policies on carbon emissions



Source: Sustainable Energy Africa (2013) Energy and urbanisation in South Africa http://www.cityenergy.org.za/uploads/resource 262.pdf Potential energy savings per Sector (GJ/a) in 9 cities of the South African Cities Network (SACN)



Source: South African Cities Network (2014) <u>http://sacitiesnetwork.co.za/wp-content/uploads/2014/07/Modelling-Energy-Efficiency-Potential-in-SACN-Cities-full-report.pdf</u>

There are significant EE opportunities at the urban level in South Africa with significant and multiple benefits



3. Activity: Mapping of urban authority influence



Break into groups of 6

Scenario: Your municipal commissioner is under pressure to reduce energy consumption

Question: How do you help the commissioner understand the drivers of energy consumption in the municipality?

What level of influence do you have on the energy consuming aspects of your municipality?



Activity: Mapping of urban authority influence

What level of influence do you have on the energy consuming aspects of your municipality?



1 = no influence

3 = some level of influence (consulted, involved as stakeholder) 5 = complete authority and direction







Energy REPUBLIC OF SOUTH AFRICA