MCN-201:
SUSTAINABLE ENGINEERING

Module 5

Bushara A R
AP, ECE
KMEA ENGINEERING COLLEGE

Module 5

Sustainability practices:

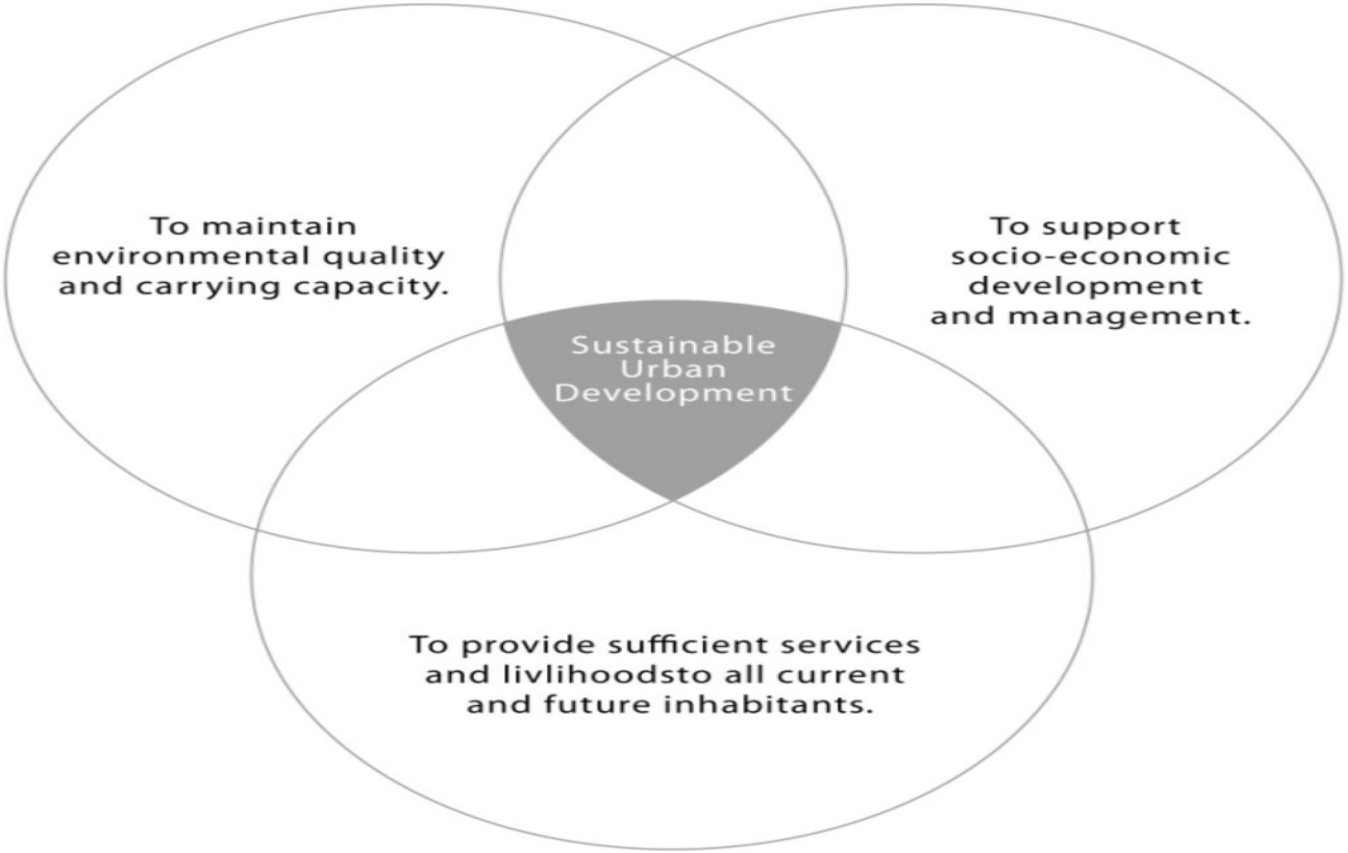
- Basic concept of sustainable habitat
- Methods for increasing energy efficiency in buildings
- Green Engineering
- Sustainable Urbanisation
- Sustainable cities
- Sustainable transport.

4. Sustainable Urbanisation

★ Sustainable urbanism is both the study of cities and the practices to build them (urbanism), that focuses on promoting their long term viability by reducing consumption, waste and harmful impacts on people and place while enhancing the overall well-being of both people and place.

Goal of Sustainable Urbanization

- Industries(existing and upcoming) should switch to clean and renewable energies as far as possible.
- Appropriate development of the existing basic urban infrastructure to provide water, sanitation & housing for urban residents.
- Monitoring and improving air quality in built environment and cities.
- Energy efficient buildings in the construction sector makes cities to reduce carbon emissions.
- City transport has to be planned properly to reduce carbon emissions.
- Practice of sustainable water harvesting and management.



Sustainable urban development—defined as capability in three aspects

Positive Effects of Urbanization:

- Creation of employment opportunities
- Technological and infrastructural advancements
- Improved transportation and communication
- Quality educational and medical facilities
- Improved standards of living

Negative effects of urbanisation:

- Population increase causes housing problems.
- Overcrowding
- Development of Slums
- Water and Sanitation Problems
- Poor Health and Spread of Diseases
- Traffic Congestion

5. Sustainable cities

- A sustainable city **enhances the economic, social, cultural and environmental well-being** of current and future generations

- These **can be pre-existing cities** that feature management directed towards reducing the inputs of energy, water and food and reducing the outputs of heat, water and air pollution, or they **can be** cities **designed from scratch** with these concerns in mind.

Characteristics of Sustainable Cities

- **Planned housing colonies** with adequate infrastructure like schools, parks, drainage system, local Medicare establishments.
- Effective **environmental infrastructure** to address the issues of untreated sewage and waste polluting rivers, lakes and coastal zones
- **Adequate governance set-up** which can meet the needs of the people and ensures civic responsibilities, transparency and equity in local institutions
- A **controlled population** for whom adequate, meaningful employment is available

- **Empowerment of women** and encouraging their participation in the political, social and economic life of a city and adoption of urban policies that take into account women's needs and initiatives
- An **efficient health-care system** which would also address issues of nutrition, family planning and sanitation
- Development of an **efficient urban private sector**, both formal and non-formal which reduces poverty by generating jobs and helping in economic growth
- Better use of **solar energy and shade trees** to reduce the use of resources

Top 5 sustainable cities

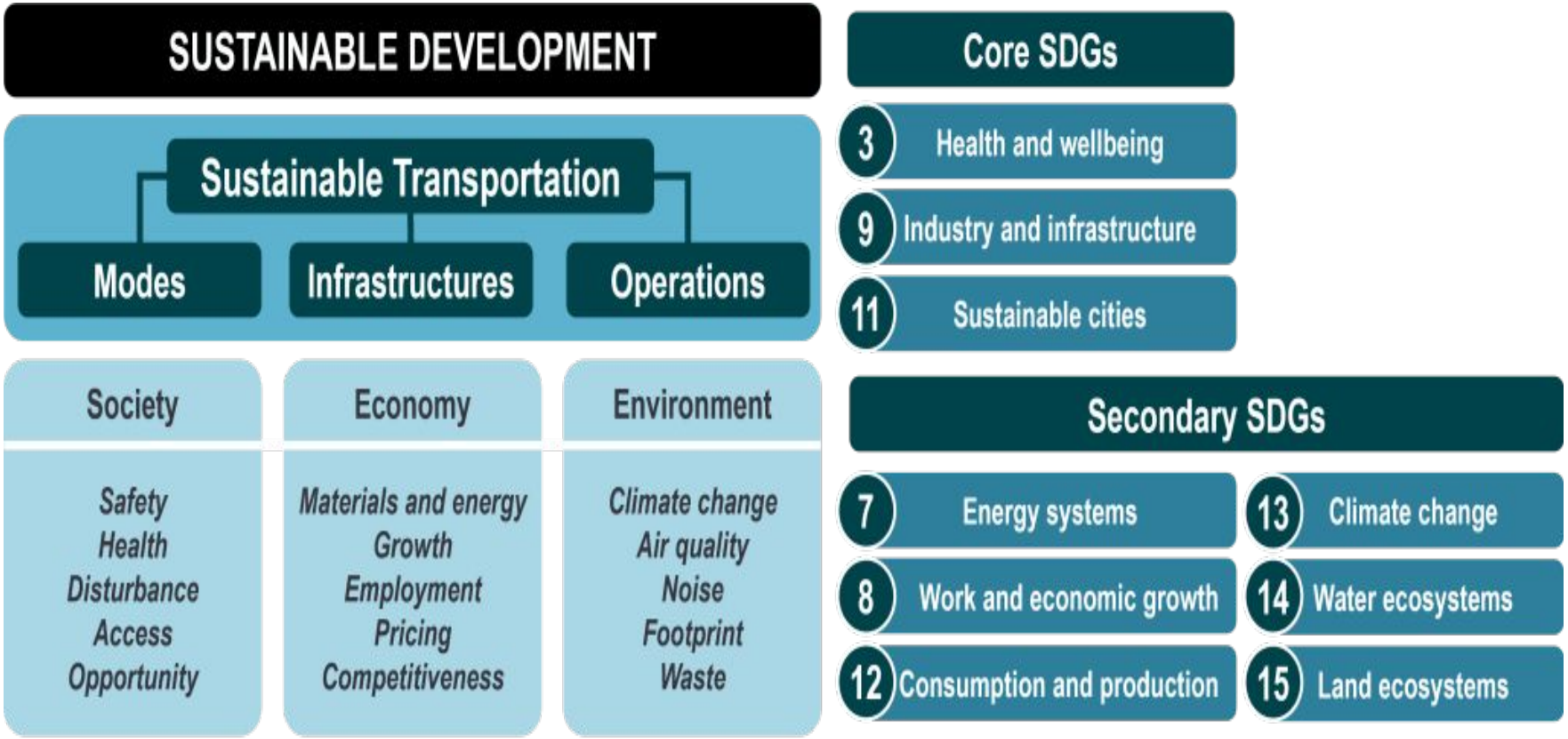
1. **Copenhagen,** Denmark - *Turning waste into power and profit.*

2. **Frankfurt,** Germany - *Harnessing teamwork to innovate faster.*

Top 5 sustainable cities

3. **San Francisco, US -** *Focusing on local production to offer global savings.*
4. **Reykjavík, Iceland-** *Collaborating to unlock cheaper renewable energy.*
5. **Singapore -** *Harnessing greener designs that work for people and the planet.*

6. Sustainable transport



➔ The concept of sustainable transportation is linked with the development of **sustainable transport modes, infrastructures, and operations.** Three major dimensions are considered:

❖ **Environment**. A reduction of the environmental impacts of transportation is a likely strategy for sustainability.

- Transportation contributes to **harmful emissions, noise, and climate change.**
- Transportation systems are also **waste generators** that must be reduced, reused, and recycled.

❖ **Economy**. Transportation is a factor in economic growth, development, and employment. It requires materials for modes and infrastructure and energy for operations, which can be used more efficiently.

❖ **Society**. Sustainable transportation should benefit society, and it should be safe, not impair human health, and should minimize disturbance in communities.

- Sustainable transportation fits within the sustainable development goals (SDG).
- Some SDGs are core to sustainable transportation, such as:
  - (3) **Health and wellbeing.** Ensuring transportation safety and the provision of opportunities through improved mobility.
  - (9) **Industry and infrastructures**. Supply chains and the mobility of passengers and freight.
  - (11) **Sustainable cities**. Urban mobility and logistics.

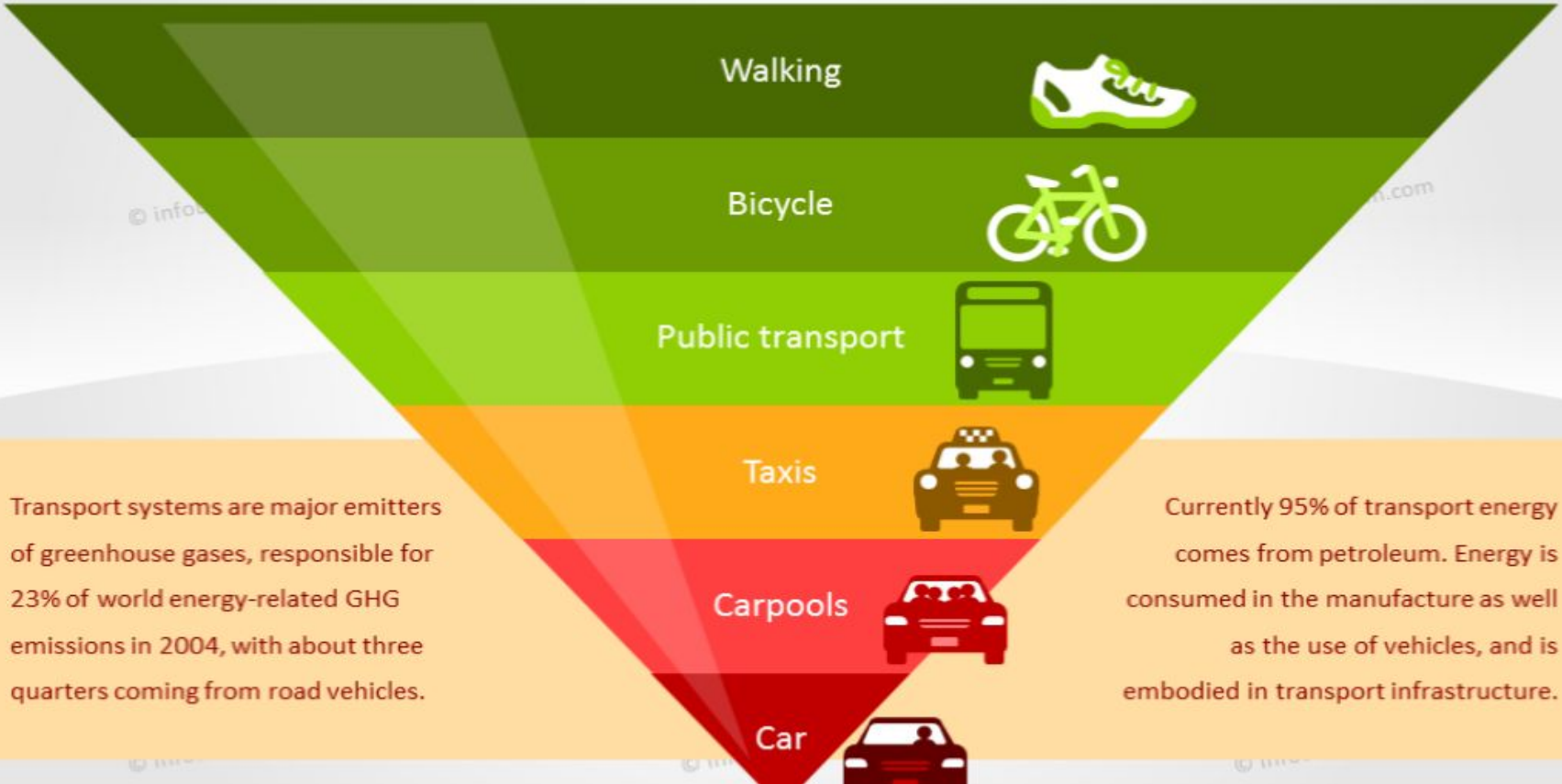
- Other SDGs are more secondary to sustainable transportation, including
  - energy systems
  - work and economic growth
  - consumption and production
  - climate change
  - water ecosystems, and
  - land ecosystems.

Benefits

Leaving your car at home and taking more sustainable modes of transportation will provide benefits for yourself and the City. These include:

- Reduced traffic congestion
- Reduced air pollution and related risks such as asthma
- Reduced greenhouse gas emissions
- Reduced dependence on non-renewable energy sources
- Reduced transportation costs
- Increased physical activity
- Increased social interaction
- Healthier lifestyles and a better quality of life

Green Transportation pyramid



Transport systems are major emitters of greenhouse gases, responsible for 23% of world energy-related GHG emissions in 2004, with about three quarters coming from road vehicles.

Currently 95% of transport energy comes from petroleum. Energy is consumed in the manufacture as well as the use of vehicles, and is embodied in transport infrastructure.