# SEC-2 Urbanisation and climate change

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**Urbanisation** has played a significant role in recent climate change, with cities and their growing populations contributing to the production of greenhouse gases and other negative environmental impacts.

The impact of urbanisation on the environment has become a pressing concern for policy-makers and urban planners, with efforts underway to promote more sustainable and resilient urban development.

**Increased Energy Use**

Energy use is one of the primary factors contributing to climate change in urban areas. As urbanisation leads to an increase in the number of buildings, businesses, and households, the demand for energy increases as well.

Cities never sleep. The 24/7 nature of urban life leads to a constant demand for energy, transportation, and other resources. Cities require energy to power buildings, streetlights, transportation systems, and other infrastructure. The demand for energy is particularly high in urban areas that operate around the clock, such as financial centers, commercial districts, and transportation hubs. The continuous demand for energy in urban areas contributes to greenhouse gas emissions and climate change.

Fossil fuels, such as coal, oil, and natural gas, are the primary sources of energy for urban areas. These fuels are burned to generate electricity, power transportation systems, and heat buildings. When fossil fuels are burned, they release carbon dioxide into the atmosphere, which traps heat and contributes to global warming.

The use of energy in buildings is a significant contributor to greenhouse gas emissions in urban areas. Heating and cooling buildings, lighting, and operating appliances all require energy, and when that energy comes from fossil fuels, it contributes to climate change. In addition, the construction of new buildings requires a significant amount of energy, particularly in the production of construction materials such as concrete, steel, and glass.

**Heavy Urban Transport**

The **transportation** sector is another significant contributor to greenhouse gas emissions in urban areas. The demand for transportation has increased with urbanisation, as more people need to travel to work, school, and other activities. Personal vehicles are the primary mode of transportation in many urban areas, and these vehicles emit carbon dioxide and other greenhouse gases. In addition, transportation infrastructure, such as roads and highways, requires significant amounts of energy to construct and maintain.

The transportation sector is responsible for approximately 23% of global carbon dioxide emissions, with urban transportation accounting for a significant portion of these emissions. In addition to carbon dioxide, transportation also contributes to other harmful pollutants such as nitrogen oxides, particulate matter, and sulphur dioxide, which can have negative impacts on human health and the environment.

**Expansion of cities and land use modification**

The growth of cities both vertically and horizontally contributes to the risk of climate change. Horizontal growth leads to land use changes by means of urban sprawl and the conversion of natural habitats and agricultural land into urban areas. This results in deforestation, loss of biodiversity, and increased greenhouse gas emissions from transportation systems required to connect distant neighbourhoods and suburbs. The construction and expansion of cities also contribute to land use changes, such as the removal of vegetation and the paving of land for buildings and roads. This leads to the urban heat island effect, where cities experience higher temperatures than surrounding rural areas due to the absorption and retention of heat by pavement and buildings. The urban heat island effect can increase energy demand for cooling buildings and contribute to air pollution, which can have negative impacts on human health and the environment.

Vertical growth, in the form of tall buildings and skyscrapers, requires significant amounts of energy to construct and maintain. These buildings often require heating and cooling systems, elevators, and other infrastructure that consume large amounts of energy.

**Waste generation and management**

Waste generation is another way in which urbanization contributes to climate change. Urbanization has led to increased consumption of goods and services, which in turn leads to increased waste generation. The disposal of waste is also a significant contributor to greenhouse gas emissions, as it produces methane, a potent greenhouse gas. Additionally, the production of goods and services requires significant amounts of energy and resources, further contributing to greenhouse gas emissions.

**Increasing Urbanisation impacts**

The impact of urbanisation on climate change has several negative effects on the environment, as well as on human health and well-being.

**Urban heat island effect**

One of the most significant impacts is the urban heat island effect. As cities grow, they absorb and retain more heat than surrounding areas, leading to higher temperatures in urban areas. This can contribute to higher energy use for cooling buildings, as well as increased air pollution, which can have negative health impacts.

**Increased flood risk**

Urbanisation can also lead to increased flood risk, particularly in areas with high levels of impervious surfaces, such as roads and parking lots. These surfaces prevent water from being absorbed into the ground, leading to increased flood risk, particularly during extreme weather events. Smog and other forms of air pollution can also have negative health impacts, particularly on vulnerable populations such as children and the elderly.

**How to Address these issues:**

To address the negative impact of urbanisation on climate change, policymakers and urban planners must prioritise sustainable urban development. This means reducing greenhouse gas emissions, increasing energy efficiency, and promoting sustainable transportation and waste management practices.

To address the impact of **energy use** on climate change, urban areas must prioritise energy efficiency and renewable energy sources. Energy-efficient buildings, transportation systems, and appliances can reduce energy demand and greenhouse gas emissions. Renewable energy sources, such as solar and wind power, can replace fossil fuels and reduce greenhouse gas emissions.

The **impact of transportation on greenhouse** gas emissions and climate change can be reduced through a variety of measures. One key strategy is to promote sustainable modes of transportation, such as walking, cycling, and public transportation. These modes of transportation emit fewer greenhouse gases and can help reduce congestion and improve air quality in cities.

In addition, promoting electric vehicles (EVs) and other low-emission vehicles can also help reduce greenhouse gas emissions. Many cities around the world are implementing policies to encourage the adoption of EVs, such as offering incentives for purchasing EVs and installing charging infrastructure.

Finally, cities can also promote the use of alternative fuels and energy sources, such as biofuels, hydrogen, and renewable energy sources like solar and wind power, to power transportation systems. Many cities are experimenting with new technologies such as electric buses, hydrogen fuel cell vehicles, and shared mobility services to reduce emissions from transportation.

Many urban areas have already taken steps to address energy use and climate change. For example, cities such as Copenhagen, Denmark, and Vancouver, Canada, have implemented comprehensive plans to reduce greenhouse gas emissions by promoting energy efficiency and renewable energy sources. In addition, the implementation of green building codes and standards, such as the Leadership in Energy and Environmental Design (LEED) certification program, has helped promote energy-efficient buildings in many urban areas.

Efforts must also be made to promote **sustainable land use practices**, such as the preservation of natural habitats and the use of green infrastructure to mitigate the urban heat island effect and reduce

flood risk. Improving water management practices, such as reducing water use and improving water quality, can also have a significant impact on the environment and human health.

In addition to these measures, **promoting green spaces** and **urban agriculture** can help reduce the negative impact of urbanisation on climate change. Urban green spaces, such as parks and gardens, can help absorb carbon dioxide and reduce the urban heat island effect. Urban agriculture can also contribute to reducing greenhouse gas emissions, as well as improve access to healthy and sustainable food options.

In conclusion, the impact of urbanisation on recent climate change is significant and requires urgent action. Urbanisation has led to increased energy use, transportation demand, waste generation, and land use changes, all of which contribute to greenhouse gas emissions and other negative environmental impacts. To address this issue, policymakers and urban planners must prioritise sustainable urban development, promoting energy efficiency, sustainable transportation, waste management, and water management practices. Additionally, promoting green spaces and urban agriculture can help reduce the negative impact of urbanisation on climate change while improving the health and well-being of urban populations.