

### Intellectual output 3. Educational support content targeting instructors

#### Learning sheets for HERA activities

## The Olympic Games come to our city

Topic: city planning, efficiency, sustainability

### Introduction

Hosting the Olympic Games is a great achievement for any city, but it comes with some challenges. The Olympics have evolved dramatically since the first modern games were held in 1896. Starting in the 1960s, both the costs of hosting and the revenue produced by the spectacle grew rapidly, making the decision of hosting such an event a source of controversy.

Building all the sports facilities, accommodation, and infrastructure needed while containing costs, making enough revenue to make the event profitable or even sustainable, or minimizing the environmental cost are some of the challenges that must be addressed to host the Olympic Games.

### Context

The game is situated in the context of a city intended to develop a new Olympic Village to host the upcoming Olympic Games. The players are responsible for building the needed sports facilities, infrastructure, and accommodation for the event. The new area should also have commercial areas, public services,

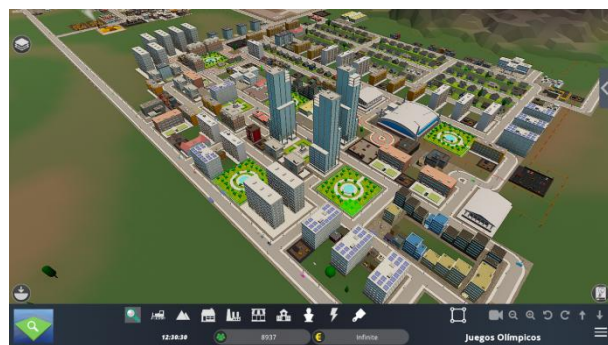


Figure 1. The city is ready to cost the Olympic Games.

and everything needed to make it functional and enjoyable. This is also an opportunity to improve other aspects of the city that the students may consider if they manage to fit it in the budget, like pollution control, public services coverage, overall happiness, etc.

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The solution can be approached in different ways. Students can create a separate village connected to the existing city or integrate the new elements in the city taking advantage of some of the existing assets.

Four roles are foreseen that students will play simultaneously, each one with its own objectives to fulfill and its own capabilities. They are:

#### Role 1: Private builder

The private builder is responsible for the construction of 5 stadiums, accommodation for 1.200 athletes and 800 visitors, and culture offerings in the Olympic village. This role can build and bulldoze housing and culture/sports.

#### Role 2: Public builder

The public builder is responsible for the construction of public roads, transportation and public services in the Olympic Village.

Any terra-forming needed must be executed by the public builder. The public builder can also support the pollution control manager with this task. This role can build and bulldoze infrastructure and public services.

#### Role 3: Communications and commerce manager

The communications and commerce manager is responsible for providing internet and phone coverage to the Olympic Village fixing any possible problems with those in the city and building new commercial establishments. The public builder can build and bulldoze commerce and infrastructure.

#### Role 4: Energy and pollution manager

The energy and pollution manager is responsible for providing a clean and affordable energy solution for the new Olympic Village, while keeping pollution in line and reducing it if possible. Pollution control task can be supported by the public builder.

There are some interactions and dependencies among the different roles, as shown below in Figure 3. All participants depend on each other to design the layout of the new



Figure 2. The city's infrastructure of residences, sports buildings, parks, and more can be enhanced to better support the Olympic Games.

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village, since they have to share the space and budget to accommodate all the buildings and services. The location of some elements, like mobile antennas, is critical for the efficiency of the system, conditioning the design. The layout determines the amount of network and energy cables needed, affecting the budget.

Besides this, the public builder must support the energy and pollution control manager with pollution control as the only role in control of the garbage collection system. The private builder can support the public builder with terra-forming.

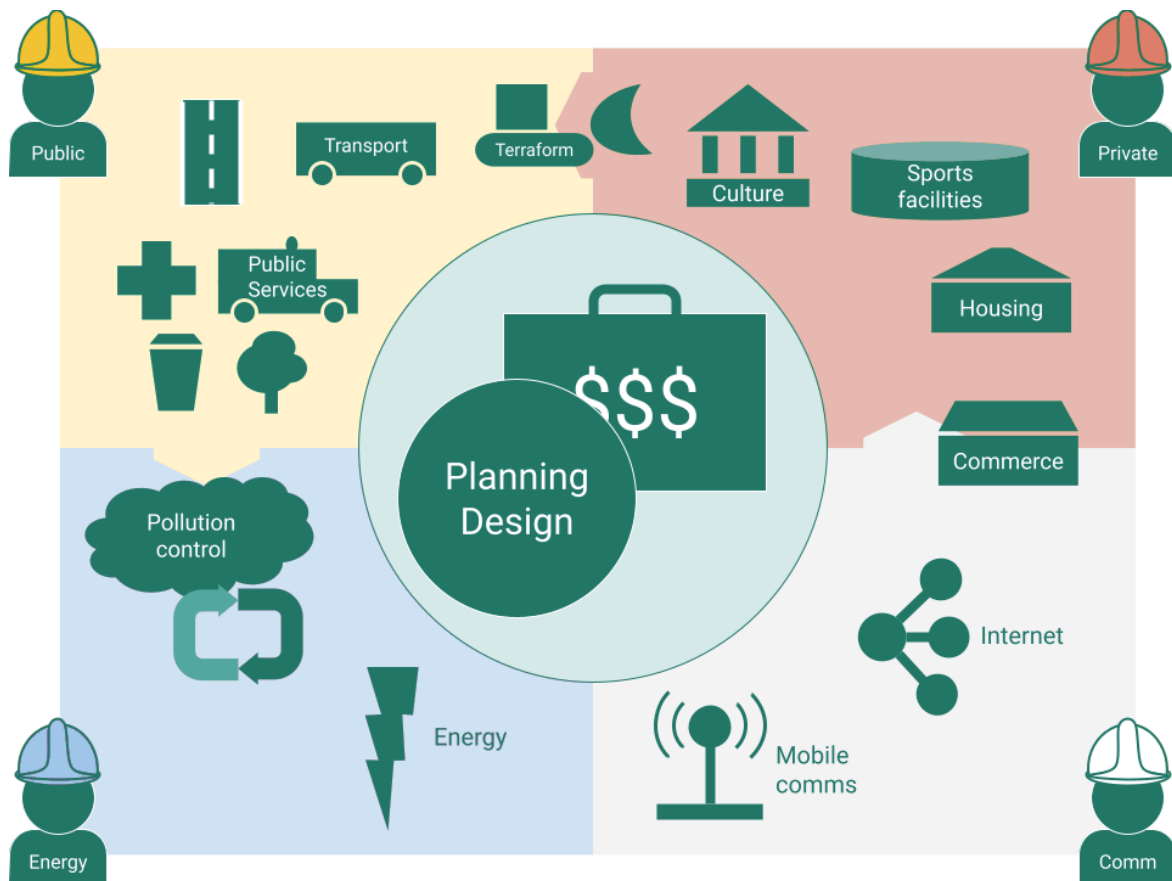


Figure 3. Role actions and dependencies.

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## Learning goals

Upon completion of the activity students will:

- Be aware of the importance of planning in order to get to a more efficient solution.
- Understand the challenges modern society and environmental changes pose for the public and private sector.
- Understand the connections between environmental, social and economic aspects of everyday life.
- Have enriched their critical thinking skills, collaboration capacity, independent research skills, and innovative thinking.

## Prerequisites

The activity can be introduced to students with minimum pre-required information. It is important to have a good knowledge of the basic game dynamics, involving the capacity to create new elements and to check the status of the different elements and layers involved in the game: energy coverage, pollution, happiness, etc. Regarding the scenario, it is self-contained, and all concepts may be introduced by the teacher during briefing. The student needs only to have basic understanding of the function of electricity, internet networks and the curiosity to design a sustainable Olympic game infrastructure.

## Audience

The suggested activity targets economics and engineering students as the construction of infrastructures that support the Olympic Games is a complex technological challenge while at the same time respecting budget constraints is significant not only in the context of a learning scenario but also in real-life.

## Core concepts

- **Sports facilities:** There is a minimum of sports facilities needed to host the Olympic Games. They will generate costs that need to be compensated with new income sources.

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- **Income sources:** Accommodation, commerce, and culture items provide revenue for the city. However, sometimes high revenue comes with a disadvantage. For instance, skyscrapers can host a lot of people and provide high revenue through taxes, but also have a high amount of energy consumption. The players must balance all this.
- **Energy sources:** The city has polluting or high risk energy sources. Players can improve this by using wind farms or solar panels to replace old energy sources and by building housing with solar roofs to reduce the amount of energy needed.
- **Communications:** The city needs to have suitable communications coverage.

## Description of the scenario

The overall objective is to build an Olympic Village as an expansion of a city in a sustainable and efficient way.

Building an Olympic Village is a huge undertaking by itself considering the costs and maintenance of the infrastructure and buildings and the environmental impact. An expansion like this needs more electrical power, more



Figure 4. Industry and an airport support the city's economic activity and well-being.

communications, more roads and buildings, which imply more costs and more pollution. In order to keep these in line, the expanded city needs renewable energy and stable income sources to remain sustainable in the long run. Besides, in order to function normally, it also needs all the standard services like communications, health coverage, etc.

Students must understand that there are three main elements that will lead to success in this scenario:

- Developing enough income sources to make the new city sustainable economically.
- Reducing pollution and switching to sustainable energy, even if it implies changing the current power sources of the city.
- Keeping a high coverage of the main city services, like health, police, communications, etc.

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## Suggested class activity

1. The teacher presents the problem to the class and introduces the scenario and game.
2. The students discuss in order to understand the problem and define possible solutions. They further discuss in order to understand the parameters that define success, such as increasing city incomes while increasing the overall maintenance cost of the city or reducing pollution as much as possible while providing all the services demanded. They further discuss the limitations set in the scenario such as restricted budgets, availability of locations for installing recycling installations and how these influence the capacity of proposed waste management building, diverse waste management techniques and related costs, and more.
3. The students are encouraged to come up with as many ideas as possible through brainstorming. Techniques of design thinking may be used to promote innovative thinking, brainstorming, sharing and building upon each other's ideas, and thinking from the perspective of city inhabitants in terms of designing a sustainable solution.
4. The students are asked to jointly decide on the ideas to implement from the pool of suggestions that they came up with taking into account restrictions, such as city plans and budget. The teacher forms groups and gives students their roles in the game.
5. The students play the game according to their roles striving to achieve individual and group objectives that may be conflicting. For example, they share a common budget.
6. The students discuss the game results and their roles; the teacher gives feedback.





Co-funded by the  
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## Assessment methods

This is an open-ended learning activity in which no single correct solution exists. Rather, the activity aims to raise awareness among students on the importance of efficient and sustainable city design and to build their knowledge on related methodologies and strategies.

Students discuss their roles and the outcomes of their activity and decide by using self- and peer assessment methodologies to what extent they have achieved their goal of developing a sustainable Olympic Village their city.