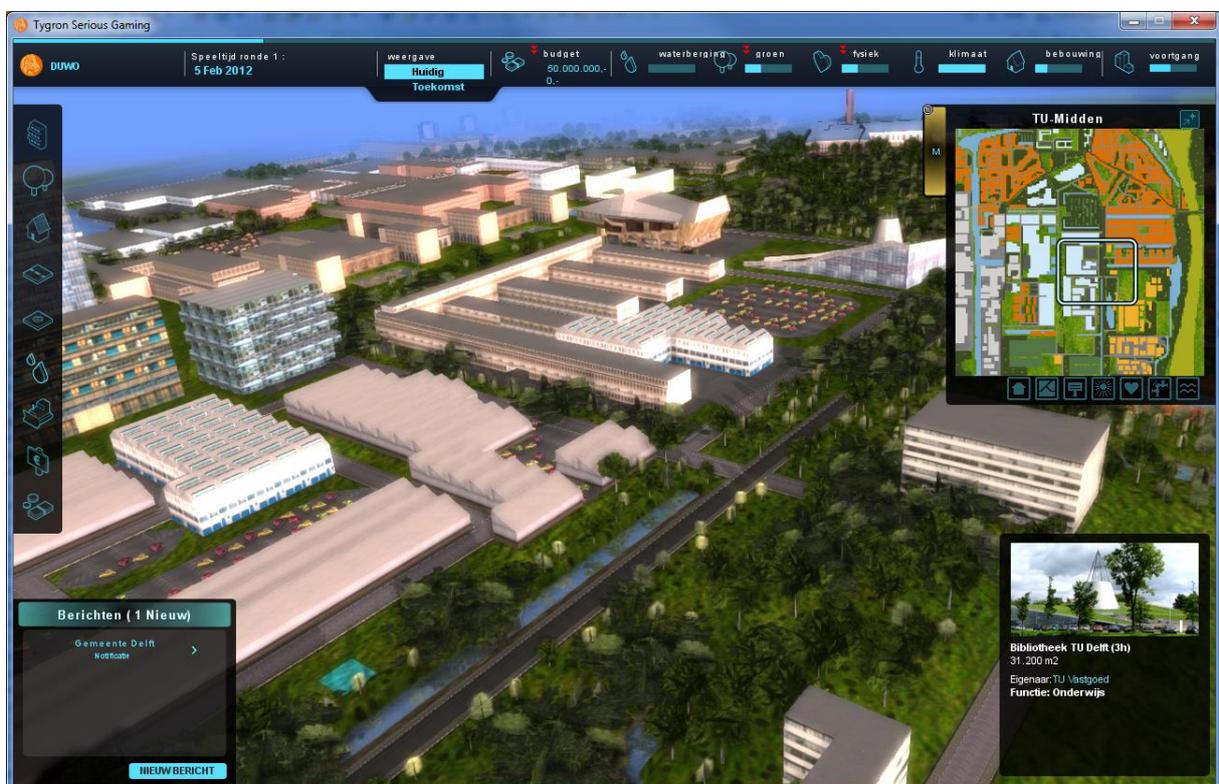# Climategame

Quick Reference Book

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1 General Information

1.1 Problem Description

The climate is changing. Global mean temperatures are rising, causing an increase of heat stress, especially in urban areas. Moreover, it is predicted that the amount of precipitation in the Netherlands will increase and that showers will be more intense (KNMI, 2006, 2010). Therefore, unless measures are taken, flooding will occur more frequently.

Many municipalities are aware of these changes and feel the urgency to take measures to adapt. However, climate adaptation is not the only responsibility of municipalities. And if it was, they do not have the resources to take these measures on their own. They are dependent on other actors that have ownership over the area or objects that have the resources to take measures. This makes the assignment for the municipality complex. How to prioritize between objectives and who to include in your plans? In the Climategame, the challenge is to find a way to deal with the climate changes and increase the livability together with other actors in the building area.

The game simulates a university area where several objectives need to be reached. The municipality has to improve a 60s neighbourhood and increase the livability of the area. Next to the objectives of the municipality, the water board has to adapt the water system to avoid flooding due to heavier rainfall now and in the future. The project developer, Uni Real Estate, needs to improve and develop the university area in such a way that it can deal with the demands of the future. Finally, the Social Student Housing has the objective to realize new student houses. These are all high-level objectives within scarce resources, particularly the available area to build, which is limited. Communication and collaboration is needed to find an optimal solution and reach all objectives.

1.2 Objectives of the game

Climategame trains students to work with different stakeholders, in order to develop an integrated approach for improvement of water management, physical environment and the livability within the university district. In addition to substantive knowledge about climate adaptation, students learn to work in a multi-actor environment and are trained on the associated social and communication skills.

The Climategame teaches students to interact with different stakeholders regarding water objectives. Climategame shows the integrated relations between storage, ground and surface water, green and the social impact of water as both a "treat" and a change to enlarge livability. Together with the procedures and institutional relations between the actors the environment is managed.

More precisely, the Climategame contributes to three different educational objectives:

1. To increase content-related knowledge
   a. Water management
   b. Physical environment

   A distinction can be made between four levels of content-related knowledge
   - Knowing the measures and their effects,
   - Using a limited set of measures in a good way,
   - Knowing and using a broad set of measures,
   - Creating and using extra measures.

2. To practice process and environment management
    - Identifying the values of the different players which are important to reach your goals in the game,
    - Communicate effectively with the stakeholders to reach your goals,
    - Gaining insights on the interdependencies between different actors and the consequences of these interdependencies on the goals,
    - Deal with the interdependencies between the different actors to reach the objectives.

3. To practice social and communication skills
    Within the learning objective of social and communication skills several sub objectives are defined
    a. Argumentation:
        - Written argumentation,
        - Written advertising,
        - Oral presentation,
        - Oral advertising.

    b. Information processing:
        - Collecting data and assessing the source of information,
        - Distinguish essentials and inessentials.

    c. Process skills:
        - Working together, leading and negotiation.

1.3 Curriculum

To integrate the Climategame within different studies suggestions are made regarding the applicability within the curriculum. Related to different learning objectives the Climategame can be used in both different content related studies such as; water management, spatial development, (civil) engineering and design, and environmental studies as process related studies such as; communication and systems engineering, policy analysis and management

Study/ module	Content	Proces management	Communication
Water management	x	x	x
Hydrology	x	x	x
Spatial development	x	x	x
Environmental science	x	x	x
Administration management		x	x
Communication		x	x
ICT	different; new applications		

Table 1.1 Curriculum applicability Climategame

1.4 Objectives in the game

Participants in the game have several objectives. They need to take measures to deal with climate change and other problems in the area. At the start of the game in 2010, the problems are limited. These problems will increase over time, if nothing happens. At the end of the game it is 2040 and the players have had to take measures which solve the problems related to the climate scenarios of that

moment in time. The effects of the different actions are measured in different ways. For a more detailed explanation of these effects see Chapter **Fout! Verwijzingsbron niet gevonden.**.

The Climategame facilitates in heavy rainfall increasing over time following the scenarios of KNMI[1]. To adapt to these types of rain showers measures are needed in various forms and by different actors. Next to the adaptation of heavy rainfall the students need to lower the **heat island** effect within the urban area (see Chapter 5.2 for more details on the heat island). With drier summers and higher temperatures in the future the physical health of the community is at stake.

Secondly, the participants of the game need to focus on how to handle water in the area. Therefore, the **water storage** indicator is included. The water storage indicator measures the amount of storage (m3) that is realized related to the required storage per neighbourhood to store peaks in rainfall. In this way, the problem of water on the streets can be solved.

Thirdly, the area is in development. Houses have to be renovated, new student houses have to be built to deal with the growing number of students, and also teaching facilities have to increase. These are measured by the **building** assignment. Consequently, this effects the physical environment. Within the physical environment of the Climategame components such as livability, green and building assignments are defined. Therefore scores are defined to the amount of realized **green** and buildings in m2. Next to this the **livability** per neighbourhood is scored on the physical part of the model of the "livability barometer" by the former ministry of Housing, Spatial Planning and Environment (Leidelmeijer, K. e. 2008). Finally, more students and teaching facilities require more **parking places.** In the final level, this also plays a role.

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[1] Dutch abbreviation of the Royal Netherlands Meteorological Institute

2 Roles in the game

This chapter describes the different roles of the game. First, the players roles are explained, followed by the additional roles played by the facilitator.

2.1 Roles of the players

2.1.1 Municipality

In general, the task of municipality is to take care of the area and its citizens. In this game, their task is limited to the spatial development of the university area. The municipality is based on the ideas of the municipality of Delft.

Task and responsibility:

The municipality has a broad social mission, and there are two things on which you are judged: livability and realization of good water management. The municipality is the actor with the main responsibility for spatial development of this urban area and is responsible for the Environmental Impact Assessment report. The municipality is also responsible for the management of the public spaces, including sewers and roads. As the municipality, you primarily have an influential role. It is up to you to manage what the other actors are planning within the area. The municipality player is responsible for approving the plans of other players.

General objective:

Increase the livability of all districts. Ensure there is a robust water system, so no flooding occurs during heavy rainfall. Motivate your partners to build student housing and construct more education buildings. Allocate your financial resources as efficiently as possible.

2.1.2 Water Board

The Water board actor is based on the role of the real Water board of Delfland. The water board's main responsibility is dealing the water issue, like water quantity and water quality. The water board has an agreement with the municipality on the realization of the water assignment and the organization of the water storage. Developing water development plans does this.

Task and responsibility

The mission of the water board is to realize a robust water system. A robust water system is accountable for adequate protection and storage during heavy rainfall. It is important that sufficient rainwater can be stored during a heavy rain shower, so no streets or houses are flooded.

General objective:

The task of the water authority is to make the water system safe, robust and manageable, and to keep it maintained. The system should provide adequate protection against severe rainfall. It is important that sufficient quantities of rain water can be stored during a heavy downpour, to avoid the flooding of roads and houses. This water can then gradually drain after the rain has stopped. In real life only a small part of the water issue is allowed to be resolved innovatively (with non-standard surfaces), but since this is a testing ground, more experimentation is allowed. 30% of the realized water storage may be innovative.

2.1.3 Housing Corporation (SSH)

The Social Student Housing (SSH) is a large housing corporation for national and international students in this city. The role in the game is based on the housing corporation DUWO. Next to student buildings, the Social Student Housing owns some business spaces. The main objective of Social Student Housing (SSH) is to realise extra student housing facilities.

Task and responsibility:

The university wants to attract more national and international students as well as knowledgeable workers. The main objective for the SSH is to ensure adequate student housing in this university town. Ultimately, 3.100 additional student houses are planned. SSH is expected to consider the livability within these new areas. Sufficient public green spaces per building are also important.

General objective:

The main purpose of the Student Social Housing (SSH) is to ensure adequate student housing in this area. Initially, there are 1.600 additional student housing needed. Ultimately, it is planned that a total of 3.650 additional student residences are realized. It is expected from the Student Social Housing (SSH) to take into account the spatial quality within these neighborhoods. It is also important in these districts that sufficient public green space per dwelling is available. The university wants to attract more domestic and international students and workers, so homes must be equipped for this too

2.1.4 Project Developer (Uni Real Estate)

The buildings and land in the university district are the property of Uni Real Estate. This includes the library, the auditorium and the buildings where faculties of the university are situated. Additionally, the Mekelpark is property of Uni Real Estate. The role of Uni Real Estate is based on TUDelft Vastgoed.

Task and responsibility:

The task of Uni Real Estate is to ensure that buildings and land in the university district raise as much money as possible. You can do this by selling or renting it to users of the buildings and land. Another solution is to use the space for multiple tasks or by using free areas for water storage.

General objective:

Ensure that the buildings and land in the university area yield as much money as possible. This can be achieved by sale or lease of the buildings and land, but also by multi-use of space and, for example, the use of unused parts for water. Sustainability is an important issue in constructing new or renovating existing buildings.