

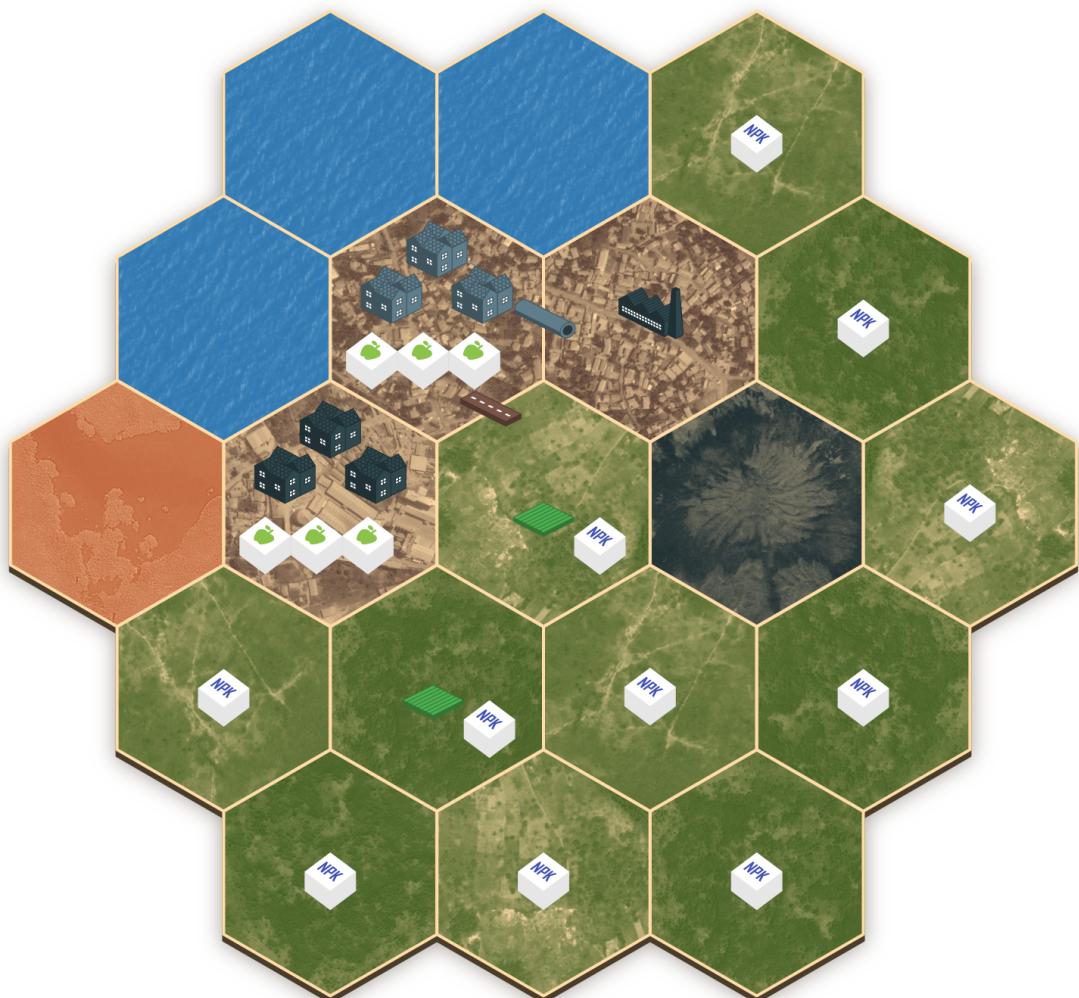


Game Rules

Poor sanitation and mismanagement of fertilizing nutrients have major negative impacts on the lives of millions of people around the world, including disease and pollution of our waterways. However, with proper management, we can reduce disease and recover valuable fertilizing products, water and energy. Safe management of sanitation waste can thus protect health and the environment, as well as increasing food security. The game aims to share knowledge about resource recovery from sanitation and supports attitude change and collaboration between players.

Basic concept

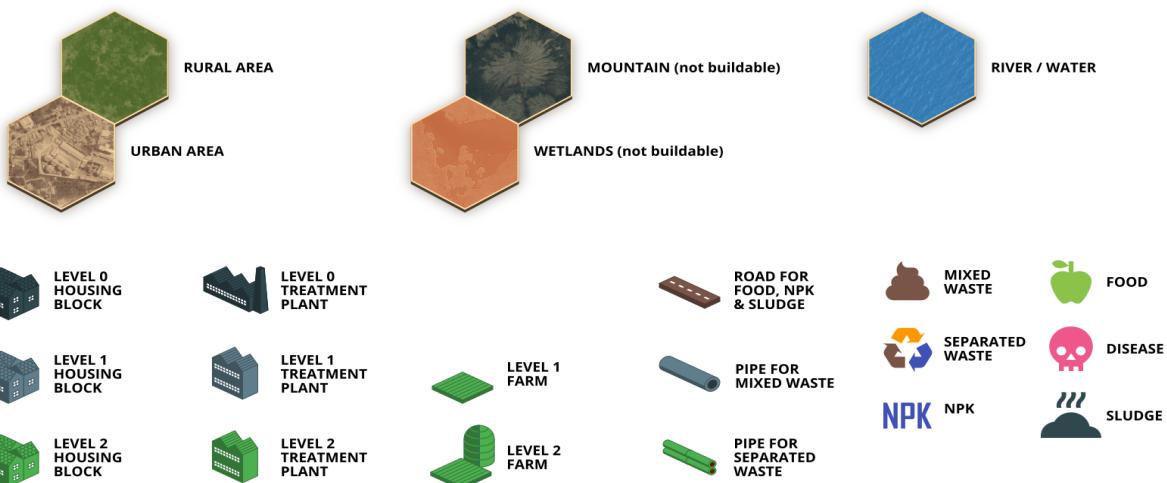
- Four players play both against each other and against the game.
- A game consists of 4 rounds, and takes approximately 2 hours.
- **Housing blocks** in the game need **Food** and produce **Waste (Mixed or Separated)**. **Treatment plants** in the game treat **Waste** and convert it into **Sludge** or **NPK** (fertilizer). The **Farms** use **NPK** to make **Food** that is sent to the **Housing blocks**. To do this, **Roads** and **Pipes** are needed for transportation.
- The player with the most points at the end wins, provided that the players have not collectively lost against the game, e.g. there is too much **pollution**, **disease** or **hunger**. Players gain points based on chosen **Infrastructure cards** during the game.



Set-up

Set up the game by laying out the **hexagons** as shown in the picture above (this can be changed to match local conditions) and place the following infrastructure as shown:

- **3 Housing blocks (level 0)** on one **Urban hexagon** + 3 resource dice showing the **Food symbol**
- **3 Housing blocks (level 1)** on one **Urban hexagon** + 3 resource dice showing the **Food symbol**
- **1 Treatment plant (level 0)** on one **Urban hexagon**
- **2 Farms (level 1)** on **2 different Rural hexagons** + 1 resource dice for each showing the **NPK symbol**
- **1 Road transportation** (brown) between one of the **Farms** and an **Urban hexagon**
- **1 Mixed Waste transportation** (grey) from a **Housing area** to the **Treatment plant**
- **Every Rural hexagon gets 1 resource dice showing the NPK symbol**



Pass out the roles (players may choose or randomly be assigned): **Housing role**, **Treatment role**, **Farming role**, and **Independent contractor role**. Each player also takes a **Hidden agenda card**. The **Hidden agendas** give players extra points for **Infrastructure cards** that have corresponding symbols, and therefore affects strategy for each player (see page 4).

Give each player **1000 coins (C)** and give **500 C** to the **City budget**.

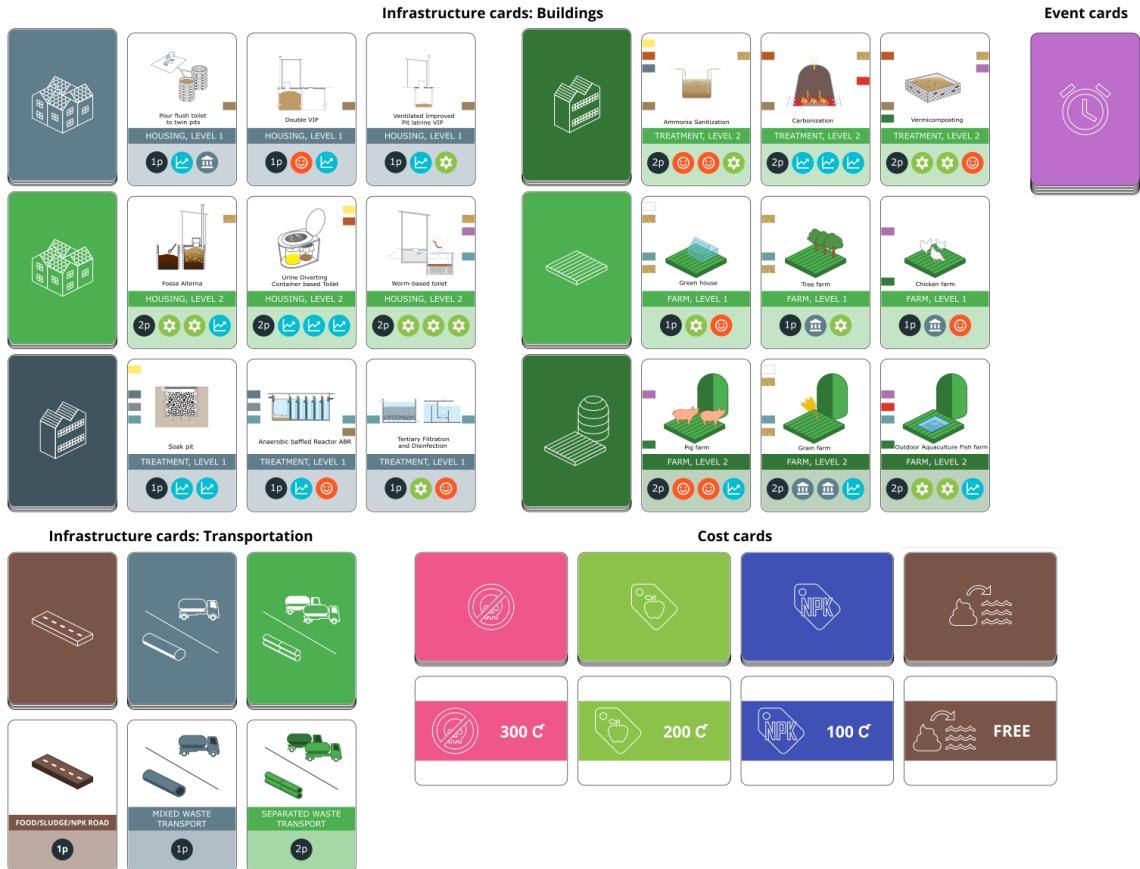
Place the different **cards** on the board, see picture on the next page.

- 6 piles with the **Infrastructure type: Houses, Farms & Treatment**, with 3 cards of each face up.
- 3 piles with the **Infrastructure type: Transportation**, face up.
- 4 piles with the **Cost cards**, one of each card face up.
- 1 pile of the **Events cards**, face down.

Set a **timer** for 10 minutes and start the timer when you are prepared to start playing.

The cards in the game

There are four kinds of cards in the game: **Hidden agenda cards** that give each player their own agenda, **Event cards** that are drawn when the alarm rings. **Infrastructure cards** used for building actions and finally, **Cost cards** that describe the costs of joint decisions.



The hidden agenda

Every player has a **Hidden agenda** that is connected to the kind of persona you are playing. Some players will be concerned about the environment, others favor economic development, while others are concerned about happiness of residents or public good. The different kinds of personas in the game are:



Environment/
Economy

Economy/
Residents joy

Residents joy/
Public good

Public good/
Environment

Environment/
Residents joy

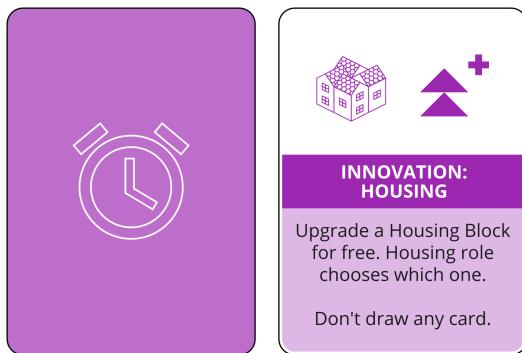
Economy/
Public Good

In the game, players are given extra points if they choose to build **Infrastructure cards** that match their **Hidden agendas**. These agendas remain with the player throughout the game, i.e. they do not rotate with the roles. Multiple players may have the same agenda symbols, which means that some **Infrastructure cards** will be of interest for more than one player. Thus, the players are advised to keep their agendas secret.

Event cards

Each time the alarm rings an **Event card** is drawn. These cards may influence the game in a positive or negative way. Positive cards often concern one player and can be saved until later, but negative cards apply immediately. Most often the effect of the card applies to the current round, but some of them describe a one-time action. **Follow the card instructions.**

If the alarm rings after all players have finished their rounds and are playing together the card is applied at the start of the coming round, if a positive card is drawn it is given to the player that will play that role the coming round.



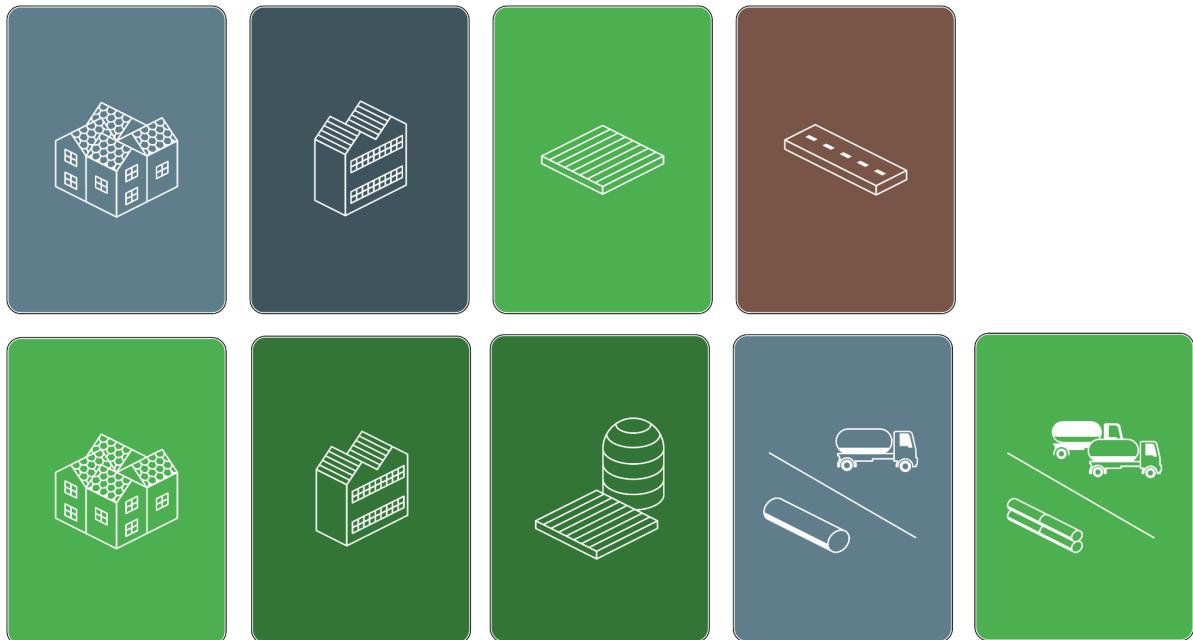
Event cards

The timer

The timer is used to indicate when an event card should be drawn. The timer is immediately restarted for ten more minutes after it rings.

Infrastructure cards

These are the cards that each player gets when he/she makes a building **Action**. The cards give each player points that are counted at the end of the game (see page 9).



Infrastructure cards

Cost information cards

Shows the cost of different **Political decisions**, which are carried out after discussion between all players at the end of every round (see page 8). There are four possible political decisions and these cards show the cost of each decision. One cost card per decision is lying face-up on the table during the game. The costs are changed/shuffled after each round:

- Vaccination. The cards show the cost per unit of **Disease removed** (200-400 C).
- Import **Food**. The cards show cost per imported **Food** resource (200-300 C).
- Import **NPK**. The cards show cost per **NPK** resource imported (100-200 C).
- Dump **Waste** in the water. The cards show cost per dumping action (0-100 C).



Cost cards

Game Round

The **Housing role** always plays first, followed by the **Treatment role**, the **Farming role** and last the **Independent contractor role**. During their turn, each player will **1) build actions, 2) fetching resources, 3) converts resources and 4) send resources**. Note: a player must complete their turn before the next player can start their turn.

Build Actions

Each player can make up to **3 build actions** per turn.

- **Housing** role can build and upgrade **Housing blocks** and build any **Transportation infrastructure**.
- **Treatment** role can build and upgrade **Treatment plants** and build any **Transportation infrastructure**.
- **Farming** role can build and upgrade **Farms** and build any **Transportation infrastructure**.
- **Independent** contractor role can do **all build actions**, but for a higher price.

Housing role unique build actions:

		Upgrade a level 0 Housing block to a level 1 Housing block: 200
		Upgrade a level 1 Housing block to a level 2 Housing block: 400
		Upgrade a level 0 Housing block to a level 2 Housing block: 500

Treatment role unique build actions:

	Build a level 1 Treatment plant: 200
	Upgrade a level 1 Treatment plant to a level 2 Treatment plant: 400
	Build a level 1 Treatment plant: 500
	Remove a level 0 Treatment plant: 500

Farming role unique build actions:

	Build a level 1 Farm: 200
	Upgrade a level 1 Farm to a level 2 Farm: 400
	Build a level 2 Farm: 500

Independent contractor role unique build actions:

Standard cost:	Contractor cost:
100	200
200	300
400	600
500	800

Transportation infrastructure (all):

	Build a road for NPK and Sludge transport: 100
	Build a Mixed Waste transportation: 200
	Build a Separated Waste transportation: 400

For every **action**, the player may choose an **Infrastructure card** related to the **action (building or transportation)**. E.g. Upgrading a **level 1 Housing block** to a **level 2 Housing block** gives the player a **level 2 Housing block card**, building a **road** gives a **Road card** (brown), replacing the level 0 **Treatment plant** gives the special card for this, etc. Players receive points for the cards that they build. All obtained **Infrastructure cards** are shown face-up in front of respective players. The cards are personal for the player and *are not rotated* with the roles.

Fetching, converting & sending resources

After each player has performed their **3 build actions** they first choose if they want to **fetch** any resources into the hexagons that are connected to their responsibility area. Next, they can **convert** resources related to their responsibility area and finally they **send** the resources they converted if they want. **Movement of resources** requires **Transportation infrastructure**. Movement of **Food**, **Sludge** and **NPK** requires **Roads** (brown) and movement of **Mixed Waste** and **Separated Waste** requires **grey** or **green Transportation**, respectively. Resources can be moved through an unlimited number of hexagons, as long as there are transportation connections (roads/pipes) between them. **Resources** that are not used/treated or cannot be transported, remain on the board in the hexagon where it is produced.

Resource actions for each role:

- The **Housing** role should **convert Food to Waste** in each **Housing block** (exactly one **Food** should be converted to **Waste** at each **Housing block** each round). The **Food** should be converted to **Mixed Waste** (from Level 1) or **Separated Waste** (from Level 2) depending on the housing type. The **Waste** may then be sent to **Treatment plants**, provided that **Transportation infrastructure** exists (grey or green transports).
- The **Treatment** role checks if there is **any Waste that can be fetched** to a **Treatment plant** and chooses if he/she wants to do so. Then he/she **converts Mixed Waste into Sludge** at Level 1 **Treatment plants** and **Separated Waste into NPK** at Level 2 **Treatment plants**. **Sludge** can be moved to the **Dump-hexagon** (see below) or a **Farm**, provided that **Roads** exist to these places. If the **Sludge** is to be sent to a **Farm**, this must be determined in consultation with the **Farming** role. Note: Only **four units of Sludge** can be stored in the same hexagon as a treatment plant, then it must be moved if the plant is to work the next round.
 - o **The Dump hexagon:** One hexagon may be selected by the players to be a **Dump**. This hexagon should be determined as soon as **Sludge** starts to accumulate. Any hexagon may be chosen and an unlimited amount of **Sludge** can be dumped there as long as there are roads from the plants producing it. Nothing else may be built on this hexagon.
 - o **The 0-level plant:** For each unit of **Waste** (max 4 units each round) that are sent to the level **0 Treatment plant**, the Treatment role roll the dice (the dice with red warning signs and green check marks), if the conversion is successful the **Waste** becomes **Sludge**, otherwise the **Waste** is moved to a **Water hexagon**, causing pollution.
- The **Farming** role may **fetch NPK and Sludge** from **Treatment plants** or rural hexagons. **NPK** is then **converted into Food**. The Farmer may choose to attempt to convert **Sludge into Food**. In this case, a conversion dice is rolled for each **Sludge** unit (the dice with disease signs and green check marks). If successful (green check) the **Sludge** becomes **Food**, otherwise the **Sludge** becomes **Disease** (disease sign on dice). Finally, the **Food** is **sent** into the Urban hexagons.
- The **Independent contractor** role must first choose one of the other characters to play the actual round. They may perform the same actions and conversions as the chosen role. Note however, that **Treatment plants** and **Farms** have limits on how many conversions they can do each round and these may not be exceeded (see below). For example, if the treatment role has used a Level 1 **Treatment plant** to convert 2 **Wastes** and the **Contractor** decides to play the Treatment role, the **Contractor** cannot use that particular plant again.

Limits in the game:

- Every **Housing block** uses 1 resource, e.g. 1 **Food** (turning to 1 **Waste – Mixed** or **Separated** depending on the housing type)
- **Max 4 Housing blocks** can be located in one urban area hexagon.
- **Max 4 resources of the same type** are allowed in the same hexagon (land or water), except in the hexagon for dumping **Sludge**, which has no limit.
- **Max 2 Treatment plants per Urban area hexagon.**
- **Treatment plant level 0** (existing plant) has capacity for 4 **Waste** (but 50% risk of non-treatment).
- **Treatment plants Level 1 & Level 2** have capacity to treat 2 **Mixed Waste/Separated Waste**.
- **Max 1 Farm** (level 1 or 2) per rural area hexagon.
- **Farm level 1** can produce 2 **Food from 2 NPK or Sludge** (with risk).
- **Farm level 2** can produce 4 **Food from 4 NPK or Sludge** (with risk).

Joint Political Decisions – All players together

After all players have taken their turn, all players discuss which (if any) of the following **Political decisions** that are needed. All joint decisions are paid with the **City budget**. If the **City budget** is not enough, the players may add from their **own coins**.

- **Import Food:** all **Housing blocks** that have not received **Food** from the **Farms** *must import Food* (see the cost on the cost information card for Food import).
- **Import NPK:** (optional) to prepare for the next round **NPK** may be bought and placed on a **Farm** hexagon of the players' choice (see the cost on the cost information card for **NPK** import).
- **Vaccination campaign against Disease** - if there is any **Disease** on the board, the players can pay to remove it from the game board (see the cost on the cost information card for vaccination).
- **Manage residual Waste** – for any untreated **Waste** remaining on the board there are two options. *NB: Both Mixed and Separated Waste remaining on the board are considered residual Waste until they are converted through treatment.*
 - o Option 1: **Dump** it in a **Water hexagon** (see the cost on the card for **Dumping**)
 - o Option 2: **Leave it** (and risk contamination and **Disease**)

Control for disease

Roll the **dice** once for each remaining **Mixed Waste** or **Separated Waste** on the board and once for each **Water hexagon** containing **4 Waste** units (the dice with disease signs and green check marks). There is a 1/3 risk that **Waste** turns into **Disease**, otherwise it remains as **Waste**.

The Game plays

Check if any of the **Losing Conditions** are met, if yes, the **game is over**:

- The **Water** is fully **polluted** (4 **Waste** units in all the **Water hexagons**).
- There are 4 or more **Disease** units on the board.
- There is not at least one **Food unit** per **Housing block** in the Urban areas (e.g. people are hungry).

Before next round

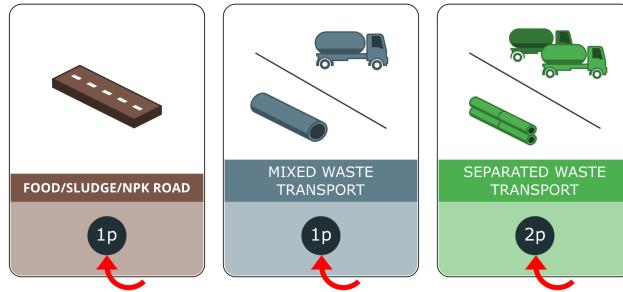
- Change all **cost information cards**.
- **Rotate all roles to the left** (NB: order of play remains the same, **Housing role** starts followed by **Treatment role**, **Farming role** and **Independent contractor role**). Each player keeps all their **Hidden agenda**, individual cards and money that was not spent.
- **For every 3 Housing blocks on the board, place 1 new level 0 Housing block.** If all existing **Urban areas** are full (max 4 **Housing blocks** per hexagon), then a new hexagon is converted from **Rural** to **Urban** (flip it over). Players can decide together which hexagon that should be turned into **Urban area** (NB: it is not possible to build on **Wetland/Mountain** hexagons). If there are no free **Rural** hexagons, or if the players decide to do so, a **Farm** can be converted into **Urban area**.
- **Every player gets a new budget 1000 coins and the City budget gets 500 coins.** Unspent money from the previous round is kept by each player (not rotated with the role).

Game end

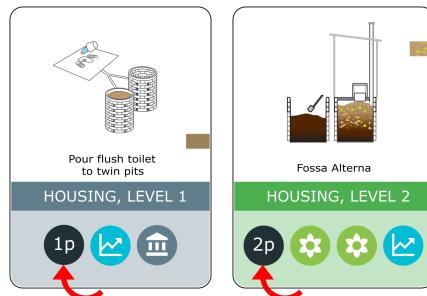
The game is over if any of the **Losing conditions** are met at the end of any of the four rounds. Provided that the players have not lost, the game is over after four rounds. At the end of the game points are counted to determine a winner. **The player with the most points wins.**

Players count their points as follows:

- **Transportation infrastructure** gives 1 or 2 points, depending on the level.
For example:



- **Infrastructure cards** give 1 point per level, e.g. level 1 cards give 1 point, level 2 cards give 2 points.
For example:



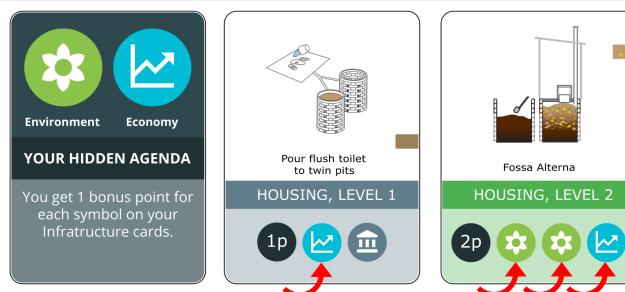
- In addition, each **Infrastructure card** gives points to the player based on their **Hidden agenda**. On each card, count all the **symbols** that match the player's hidden agenda.
For example:

For example: A player with the Environment/Economy agenda get extra points for all cards with corresponding symbols

The Housing level 1 card rewards the player 1 extra point Economy symbol but no point for the Public Good symbol.

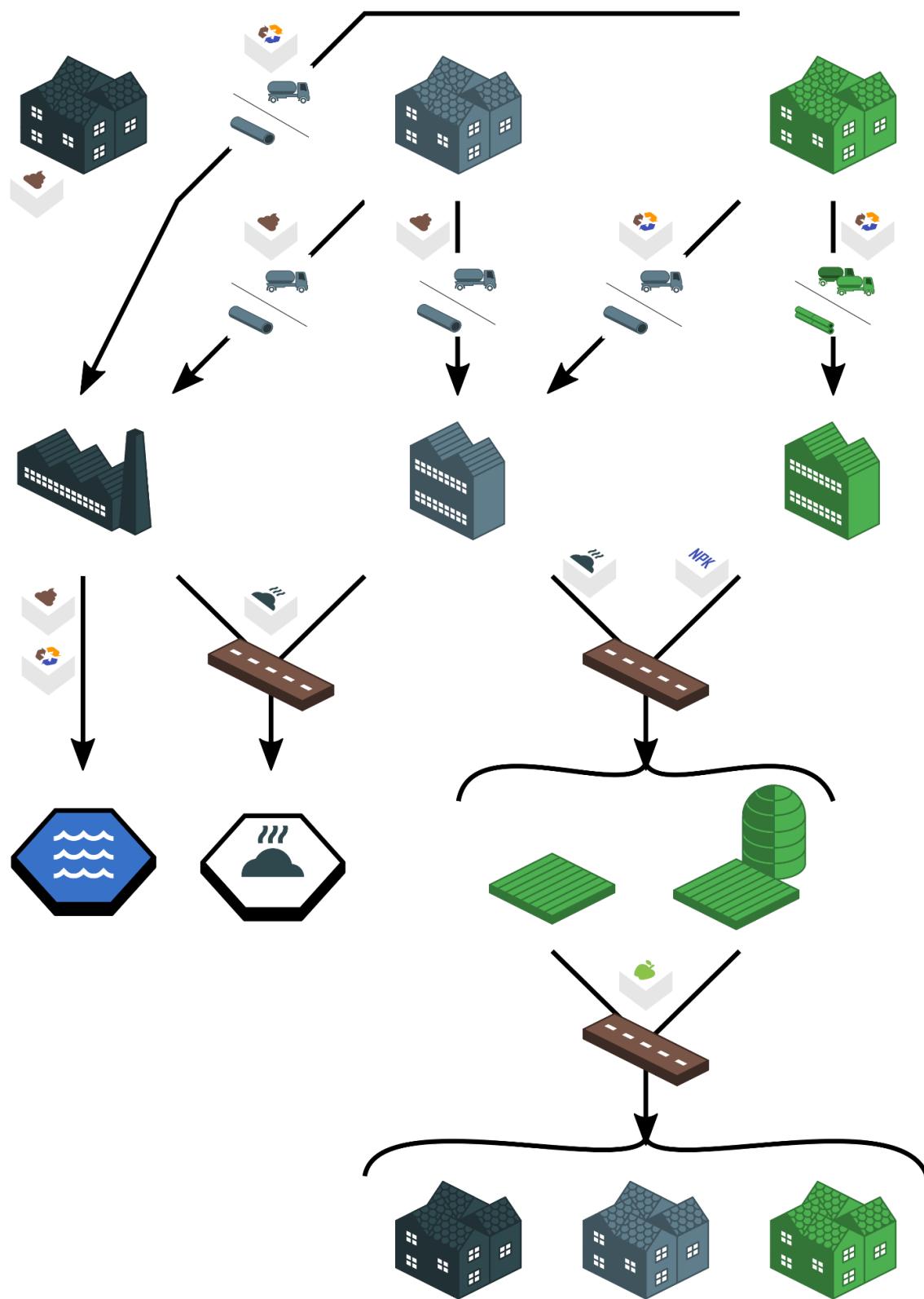
The Housing level 2 rewards the player 2 extra points for the Environment symbols and 1 point for the Economy symbol.

In this example, the player gets a total of 7 points including the level points (dark circles).



Conversions and movement of resources

This figure illustrates the possible movements and conversions of the resource dice.



Credits

Project initiator

Jennifer McConville, Swedish Institute of Agricultural Sciences

Game design

Jennifer McConville, Swedish Institute of Agricultural Sciences

Erik Ambring, Kaupa It Ab

Carl-Axel Ambring, Kaupa It Ab

Monica Billger, Chalmers University of Technology

Jaan-Henrik Kain, Chalmers University of Technology

Graphic design

Erik Ambring, Kaupa It Ab

Annika Nordin, Swedish Institute of Agricultural Sciences

Thanks to all participants in playtesting and feedback

In Uganda:

Charles Niwagaba, Innocent Tumwebaze, Byansi Lawrence, Francis Ndyabawe, Baingana Eric Mugyenzi, Jacinta Nekesa, Evaline Natyang, Onesimus Semalulu, Cate Nimanya, Ronald Sakaya, Gava Job Ssazi Dun, Christopher Kanyesigye, Mohammed Babu, Najib, Lukooya Bateganya, Julian Musiime, Jude Zziwa, Allan Nkurunziza, Eunice Namembe, Eva Ndawanga, Susan Najjuma, Shanon Okenga, Eric Omonyi, Teddy Gwoyazika, Harold Wanok, Isaac Turyatemba, Francis Ndyabawe, Annet Ahimbisibwe, Amit Kayene, Faithful Atusinguza, Henry Patrick Erute, Mark Kiffe, Wycliffe Ssekadde, Vivian Nambooza.

In Sweden:

Alexander Spak, Jenny Stenberg, John Arvidsson, Shaswati Chowdhury, Annsofi Björkman, Martin Vanký, Angela Penacastro, Annika Nordin, Prithvi Simha, Chea Eliyan, Lovisa Lindberg, Helen Zewdie Kine, Mahlet Demere Tadesse, Alice Isibika, Jenna Senecal, Luis Fernando Perez Mercado, Evgheni Ermolaev, Giulio Zorzetto, Viktoria Wiklicky.