

Official Game Manual & Rulebook

CIRCULAR ECONOMY SIMULATOR - 64 STEPS TO BALANCE (CES 64)

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THE GAME COMPONENTS & PHYSICAL DESCRIPTION

1. The Design Philosophy: Trash to Treasure

"Circular Economy Simulator - 64 STEPS TO BALANCE" (CES 64) transforms fragmented waste into a living artistic masterpiece. With the sole exception of the educational card decks, the entire game project is handcrafted using **crystal-clear Epoxy Resin**.

This high-durability Epoxy Resin acts as a physical time capsule or "vessel". It permanently traps real industrial waste alongside organic elements from nature. This design choice gives raw components a **"Second Life" (Upcycling)**. It allows players to visually see and physically touch the materials while playing.

The game serves as an interactive educational tool. It bridges active tabletop play with the **17 United Nations Sustainable Development Goals (SDGs)**, specifically targeting four core global criteria through an innovative blend of **Collaborative Democracy & Stealth Learning**:

- **Goal 4: Quality Education: Collaborative Democracy & Stealth Learning** —Utilizing a dynamic gamification board, the system teaches sustainable resourcing while fostering stealth learning. Here, players practice individual or collaborative decision-making, voting, and collective negotiations.
 - **Goal 12: Responsible Consumption and Production** — Celebrating material longevity and waste reduction.
 - **Goal 14: Life Below Water** — Highlighting marine ecosystem preservation.
 - **Goal 15: Life on Land** — Connecting players to terrestrial biodiversity protection.
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2. The Game Board Foundation

The physical board features a high-durability **64-field grid** cast from a custom silicone chess mold. It requires a detailed **5-to-7 days layering and curing process**. Once fully cured, the resin becomes completely inert, solid, and safe for children to handle and play.

The board serves as a visual map of environmental choices. It is split cleanly between "Good vs. Bad," "Responsible and Irresponsible," and "Awards and Punishment". The 64 spaces are color-coded to represent the delicate ecological balance of our planet:

Field Type & Color	Trapped Resin Inclusions (Materials)	Real-World System Symbolism
 BAD (Waste Fields)	Plastic corks (PE corks), aluminum foil, plastic bottle caps, chewing gum, upcycled fabric/clothing scraps, candy wrappers, copper wire and springs & screws.	Represents the carbon footprint, linear economy waste, and industrial pollution that cause severe player setbacks.
 BAD (Toxic Hazards)	Button Battery No. 10 and Radioactive Material No. 62.	Signals urgent environmental dangers, toxic chemical leaks, and strict gameplay punishments.
 GOOD (Awards)	Nigella seeds, Green Clover, Corn Kernels, Star-of-Bethlehem, Linden Tree Leaf, Natural cork, Sea shells, Mung beans, Ginkgo Leaf, Lesser Celandine Flower, Sea glass, Flowering Quince	Represents zero-waste goals, natural recycling, and the preservation of pure coastal ecosystems.
 GOOD (Nature)	Clean Park Paths, Lichen, Natural cork, Eggshells, Pistachio Shells, Corn Kernels, Peanut Shell, Moss, Sesame seeds, and Grass seeds.	Symbolizes reforestation, biodiversity, and "The Lungs of the Earth" where players find safety.
 GOOD (Ocean)	Clean water paths, washed tempered glass, sea glass, and vibrant marine elements.	Symbolizes healthy aquatic life below water and clean, unpolluted rivers and marine tracks.
 GOLD The Ultimate Balance	The final Gold Bee Field at the very center of the board grid.	Represents the Bee as "The Most Important Living Being On Earth" and the success of a true circular economy.

3. The Playing Pions (Character Figurines)

The game includes five unique, handcrafted Epoxy Resin figurines. Cast using narrow chess molds, where each "pion" figurine features distinct embedded inclusions representing specific ecological roles and SDGs. Every figurine sits firmly on a color-coded Status Indicator Base aligning them with their corresponding board fields:

- **The Nature King (White Base):** Features trapped dry flowers and leaves. Aligns with White Fields representing Zero Waste & Responsible Consumption, **SDG 12**, reminding players of the Circular Economy and to protect and love nature's purity.
 - **The Forest Guardian (Green Base):** Features trapped natural elements, representing **Life on Land (SDG 15)** and corresponding to Green Fields. It symbolizes fresh growth and the "Lungs of the Earth," where players find safety and progress.
 - **The Coastal Guardian (Blue Base):** Features trapped washed-out empty seashells and natural coastal elements. Aligns with Blue Fields representing **Life Below Water (SDG 14)**. It symbolizes crystal-clear water and healthy marine ecosystems, reminding players to keep beaches clean and waters pure.
 - **The E-Waste Raider (Red Base):** Features trapped upcycled electronic components. Aligns with Red Fields representing Hazardous Waste and Emergency Warnings, **SDG 12**. It warns players of fast technological electronics growth and hidden E-waste dangers.
 - **The Industrial Queen (Black Base):** Features trapped copper wire and other upcycled industrial elements. **Aligning** with Black Fields, it **represents Carbon Emissions** and Irresponsible Production, **SDG 12**. Acting as the shadow of pollution, it reminds players of the heavy manufacturing footprint left behind by modern industries.
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4. Nature's Piggy Bank (Physical Economy Tokens)

The game operates on a tangible physical coin and jewelry economy. Tokens are cast using shimmer, hand-blended **Mica pigments** for instant visual recognition:

- **Lucky Charms (Pendants):** Beautiful Epoxy Resin Jewelry containing delicate flowers, leaves, or sea shells awarded for outstanding eco-care. Worth **10 to 20 points** for final scoring or used as a protective shield.
 - **Resin Award Coins:** Positive currency earned via circular choices and proactive recycling paths.
 - **Gold Crown:** Worth **7 points** or used to leap up to 7 fields forward.
 - **Gold Checker:** Worth **5 points** or used to step up to 5 fields backward.
 - **Silver Crown:** Worth **3 points** or used to step up to 3 fields forward.
 - **Silver Checker:** Worth **1 point** or used to step exactly 1 field backward.
 - **Red Debt Coins:** Negative loan tokens forced upon players who go bankrupt due to environmental pollution fines.
 - **Red Crown:** Worth **-7 points** at final endgame scoring.
 - **Red Checker:** Worth **-3 points** at final endgame scoring.
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5. The Complete 108 Card Architecture

The game system utilizes exactly **108 double-sided cards** split across five highly dedicated decks to bridge active gameplay with environmental knowledge:

[TOTAL DECK: 108 CARDS]

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[A7 STANDARD DECKS]

[A6 EDUCATIONAL DECKS]

[REFERENCE SETS]

- Action Decks (43)
- Surprise Deck (18)
- Did You Know? (35)
- Golden Bee Set (12)
- Lucky Charms (7)
- Coin Manuals (6)

a) A7 Size Format Cards (61 Cards Total)

- **Call to Action Cards (43 Cards):** Provide immediate gameplay movement, construction upgrades, or specific choices when a player lands on an inclusion space. The front face of these cards features a **vibrant image of the specific field inclusion** to anchor the visual asset.
- **The Surprise Deck (18 Cards):** Shuffled into a single, random draw pile. It contains **12 Bad Cards** (6 Red Alerts for severe hazards, 6 Black Alerts for footprint setbacks) and **6 Good Cards** (3 Green Rewards for forestry, 3 Blue Rewards for pristine oceans).
- **Resin Coin Reference Cards (6 Cards):** 2 Red Cards (Debt/Loans), 2 Silver Cards (Standard Rewards), and 2 Gold Cards (Premium Stations/Upgrades). These are small, compact guides kept by the players' personal coin piles.

b) A6 Size Format Cards (47 Cards Total)

- **"Did You Know?" Educational Cards (35 Cards):** Placed text-side down on the table. To maintain a clean interface, these cards contain no pictures—they display only the **field number**, the **matching tracking color**, and the **"Did You Know?" fact text** to teach real-world environmental facts.
 - ● *Black Backing:* 8 Cards
 - ● *Red Backing:* 2 Cards
 - ○ *White Backing:* 11 Cards
 - ● *Green Backing:* 12 Cards
 - ● *Blue Backing:* 2 Cards

- c) **The Golden BEE Cards (12 Cards):** Premium gold-colored narrative cards read aloud at the finish line. They share vital information about the survival of the **Bees**, educating children on why the honeybee is officially declared the single most important living being on Earth due to its baseline role in global pollination, biodiversity, and ecosystem survival.

- d) **Lucky Charm & Joker Key Cards (7 Cards Total):** These serve a dual purpose as in-game Action Cards and core Rule Guides. The front face features a **vibrant, high-definition image of the target natural inclusion**, while the reverse side elegantly displays the specific field point values (ranging from **10 to 20 points**), the custom **Resilience Shield** rules, and the step-by-step **Joker Key** backup activation guidelines.

- e)* **Appendix: additional A7 Size Format Cards (4 Cards) Recycling Station Upgrades**
Special reference cards used for constructing and tracking newly built Recycling Stations.

GAME-PLAY & "CIRCULAR" RULES

1. Player Capacity & Collaborative Democracy

The game adapts seamlessly to both home and school environments. It operates under a unique system of shared cooperative governance:

- **Individual Capacity:** Matches support a maximum of **5 individual players**.
 - **Group Capacity:** Ideal for school "**Play and Learn Days**". Up to **5 teams** can compete together.
 - **Team Sizes:** Teams can include any number of students. **Uneven numbers** are highly recommended.
 - **Collaborative Democracy:** Facing tough choices requires a team vote. Splits like **2:1** or **3:2** settle team strategy instantly.
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2. Choosing Figurines & Starting the Journey

The starting sequence centers around the younger generation:

- **The Youngest Player Rule:** The **youngest player** chooses their figurine first. They also execute the very first move. This reinforces that our planet's future belongs to them.
 - **Starting the Engine:** The youngest player rolls the die to begin.
 - **Turn Direction:** Gameplay proceeds strictly in a **clockwise direction**.
 - **The Momentum Rule of 6:** Rolling a **6** grants an immediate bonus roll! This represents positive momentum in sustainable action.
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3. Core Movement Mechanics

Players navigate a 64-field grid using real material landmarks:

- **The Path:** Roll the die to move your figurine forward.
 - **Interactive Inclusions:** Every landing space is a learning event. Players must interact with the trapped material. The space dictates a reward, setback, or Call to Action.
 - **Neutral Green Zones:** Empty green fields represent pristine grass. Players sit safely and wait for their next turn.
 - **Neutral Blue Zones:** Empty blue fields represent clean waters. Players safely swim while waiting for their turn.
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4. Field Consequences: "Good vs. Bad" Logic

Every space teaches that choices carry immediate environmental consequences:

- **The "Good" Fields (White, Blue, Green):** Landing here represents highly sustainable choices. Rewards include extra dice rolls, points, or forward leaps.
- **The Eco-Trap Warning:** Beware hidden eco-traps. Some **"Good"** color fields contain **"Bad"** inclusions. Landing on a trap triggers a Call to Action.
- **Voluntary "Did You Know?" Learning:** Landing on any inclusion lets players lift the matching A6 card. Reading the real-world science aloud educates the entire room.

5. The Strategic Surprise Card Choice

Most of the Bad Field action cards present a dilemma featuring two distinct path options:

- **Path A: Direct Punishment:** Accept the immediate, strict penalty written directly on the field's matching Call to Action card.
- **Path B: The Surprise Gamble:** Risk drawing from the **18 Surprise Cards** pile instead.
 - a) **The Forgiveness Element:** Drawing a Good Card acts as instant redemption! It grants valuable moving forward boosts or points awards while completely discarding the primary action card punishment.
 - b) **The Risk Factor:** Drawing a Bad Card overrides everything, hitting the player with random setbacks, freezing penalties, or severe bank fines.



THE RESIN COIN ECONOMY & ECO-STATION UPGRADES

1. The Multi-Tiered Coin Mechanics

The currency system mirrors real-world sustainable finance. Coins are divided by value, composition, and specific tactical tracking directions:

- **The Crown currency (Forward Acceleration):** Gold Crowns (+7 points) and Silver Crowns (+3 points) represent highly proactive environmental actions. They allow players to accelerate forward along the board track.
- **The Checker currency (Strategic Reversal):** Gold Checkers (+5 points) and Silver Checkers (+1 point) represent defensive eco-investments. They are explicitly used to calculate tactical moves backward to escape incoming board hazards.
- **The Anti-Penalty Shield Rule:** If a standard dice roll forces a figurine to land on a dangerous Black or Red field, the player may instantly spend a coin from their stash to the bank. Doing so allows them to override the dice roll and move forward (using Crowns) or backward (using Checkers) by the exact face value of that coin to find a safe zone.

2. The 3D Eco-Station Construction & Upgrade System

Players can actively transform the infrastructure of the board during the match by building custom 3D resin **Recycling Stations (RS)**:

- **Permanent World Infrastructure:** Fields **16 (Blue)**, **29 (Blue)**, and **32 (Green)** are pre-built, permanent recycling stations that exist from the very beginning of the game. They act as immediate safe zones.
- **Mid-Penalty Station Construction:** When a player lands on an unfinished hazardous space and elects to construct a *new* 3D Resin Recycling Station, they must freeze their figurine in place (2 rounds for standard fields, or 3 rounds for high-danger Red fields). After the full construction freeze is successfully completed, the player is immediately rewarded with **1 Silver Crown** from the bank.
- **Positive Field Station Construction:** Building a *new* 3D Resin Recycling Station from an active, positive field space triggers an instant payoff. The player moves to the space, constructs the station immediately with no movement freeze, and is instantly awarded **1 Golden Crown Coin** for their engineering!

- **Permanent World Modification:** Once a 3D Resin Recycling Station token is physically placed onto a field, that space is permanently upgraded into an active Recycling Station for the rest of the game! The old properties are completely erased, creating a new hub where players can recycle. For the remainder of the match, any player who lands on that completed station is rewarded with a premium **1 Golden Checker Coin**.

* APPENDIX

2a. Building RS from Fields 27 and 39 (Microplastics)

Field 27: Ocean Filter Construction

Field 27 presents hidden microplastics in the water—a black footprint to our ecosystem. The player landing here immediately rolls the dice a second time.

- **If the dice is Even:** They successfully activate the Ocean Filter and place the **Yellow** Epoxy Resin **Bin**. From that moment on, the field becomes an *Ocean Filters Recycling Station*, AKA **"Yellow Station"**. Any future player landing there receives **1 Golden Checker Coin** from the bank for cleaning the filters.
- **If the dice is Odd:** The "Filter Installation" fails, and players must face the setback from the action card.

Field 39: Ocean Skirt Upgrade

Field 39 represents a thick microplastics zone near the final stretch—a black footprint to our ecosystem. The player landing here immediately rolls the dice a second time.

- **If the dice is Even:** They successfully deploy the Ocean Skirt and place the **Yellow** Epoxy Resin **Bin**. From that moment on, the field becomes an *Ocean Filters Recycling Station* AKA **"Yellow Station"**. Any future player landing there receives **1 Golden Checker Coin** from the bank for checking the Ocean Skirt!
 - **If the dice is Odd:** The installation of the "Ocean Skirt" fails, and they must face the setback from the action card.
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3. The Red Coin Debt & Bankruptcy System

If environmental neglect or heavy pollution fines drain a player's wallet completely, the game introduces a strict financial fallback mechanic:

- **The Zero-Point Threshold:** A player's active physical coin stash can never drop below zero during live gameplay.
- **The Bank Loan System** If a card demands a point fee that the player doesn't have, they must immediately claim high-penalty **Red Coins** from the bank to cover the balance.
- **Debt Classifications:**
 - Red Crown:** Represents a severe emergency financial shortfall. Worth **-7 points** at the final end-game calculation.
 - Red Checker:** Represents a mid-tier compliance fine (specifically triggered by Lithium Battery hazards). Worth **-3 points** at the final end-game calculation.
- **The Endgame Weight:** Red Coins are kept in the player's tray until the absolute end of the match, where they directly subtract points from the final **Planet Winner** score.

4. Lucky Charms & The Resilience Shield

The “**Lucky Charms**” are premium Epoxy Resin Jewelry pieces (**wearable art**) won by landing on pristine white or green natural inclusion spaces. They act as life-saving armor with strict elemental limitations:

- **The Passive Score Value:** Each earned charm carries a massive core value ranging from **10 to 20 points** for the final endgame calculation.
- **The Active Resilience Shield:** A player may cash in their physical charm to activate its thematic shield during a major movement penalty. The shield mathematically absorbs a matching number of setback fields equal to its value. For example, if a player faces a heavy backward penalty of 32 spaces, activating the 20-point “*Ginkgo Biloba Lucky Charm*” allows them to absorb 20 fields of the drop, forcing them to move backward only 12 fields instead.
- **The Red Alert Void Exception:** The Resilience Shield is completely powerless against **Red Field Action Cards**. Toxic radioactive hazards and severe chemical spills melt right through the armor; these emergency punishments cannot be blocked or mitigated by a Lucky Charm under any circumstances.
- **The Joker Key Backup:** There is only one custom resin **Joker Key** token in the bank. If a player lands on a Lucky Charm field but a previous opponent has already won and taken that specific physical charm, the landing player immediately claims the Joker Key instead. The Joker Key acts as a perfect mirror replica, granting the exact same point values, usage rules, and shield protections as the missing treasure.

5. Standard Card Interdependency Parameters

Certain Action Cards feature specific interaction conditions that cross-reference the board track state or peer placement:

- **The Sidewalk Sticky Trap (Chewing Gum Field 9):** When stuck, players can choose Path A to wait for any trailing player piece to pass their tile and unstick them for free. However, if the player is entirely alone on that section of the track with no players behind them, they must automatically execute the fallback rule: freeze for 2 rounds and pay a **5-point fine** to the bank to free themselves.



THE GOLDEN FINISH LINE & FINAL POINT SCORING

1. The Endgame Framework & The Golden BEE Cards

The game does not abruptly end when a single player crosses the line. The final phase is a collective race toward global stability:

- **The Completion Condition:** The active match officially continues until the **very last player** safely navigates their figurine to the final space.
- **The Finish Line Trigger:** The game track finishes at the **Gold Bee Field** at the center of the board grid, celebrating the honeybee as the foundation of terrestrial life.

- **The Golden BEE Card Ritual:** Upon landing on the Gold Bee Field, the finishing player immediately draws 2 Golden **BEE Cards** from the deck and reads them aloud to the entire room. These cards share high-importance educational facts detailing the miracle of bees and global sustainability solutions.
 - **The Safe Zone Buffer:** Once a player has finished their reading ritual, they place their figurine safely on the Gold Bee Field and transition into a role on the **Planet Council** to stay fully active in the session.
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2. The Planet Council System (Post-Finish Engagement)

To completely prevent player boredom and eliminate text-heavy administrative math tasks for children, players who finish early take on powerful rolling leadership positions to guide the remaining players home:

- **1st Finisher — Chief Eco-Consultant:** Manages the physical Bank vaults and acts as the primary strategic advisor during Dilemma card paths.
 - **2nd Finisher — Democracy Ambassador:** Manages team governance. They lead all collective team votes during Collaborative Democracy events and hold the ultimate tie-breaking vote if the active table is deadlocked.
 - **3rd Finisher — The Eco-Builder:** Manages the physical board infrastructure. They physically place the custom 3D resin Recycling Stations onto the grid for active players and serve as the structural guardian for all marine and terrestrial wildlife fields.
 - **4th Finisher — The Planet Accountant:** Manages the game table setup for the final tally. They help organize the discarded card piles, clean up the empty token trays, and physically pass out the score sheets to all players to prepare the table for the final point calculations.
 - **The Global Sponsorship & Legacy Loan Rule:** *All players who have successfully finished the game and joined the Planet Council are legally permitted to actively sponsor trailing players! They can gift positive Crown coins, lend out their remaining Lucky Charm armor shields, or issue strategic bank loans to help the whole team reach the Gold Bee Field faster. Furthermore, these collaborative loans can be tracked across back-to-back sessions played on the same day or a future day, creating an ongoing sustainable economic legacy between games!*
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3. The Dual Winner Metric

"Circular Economy Simulator - 64 STEPS TO BALANCE" CES 64 crowns two distinct champions at the conclusion of the match, balancing physical performance with environmental responsibility:

- **The Speed Winner:** The very first individual player or team to successfully pilot their custom character figurine onto the final Gold Bee Field space.
-  **The Planet Winner:** The player or team who accumulates the single **highest grand total of net points** at the exact moment the final player crosses the finish line.

4. Mathematical Point Calculation Matrix

Once all players have completed the track, the final scoreboard is calculated. All positive environmental rewards are added together, and all negative debt tokens are subtracted:

$$\begin{array}{l} \text{[GRAND TOTAL POINT FORMULA]} \\ \text{(Total Lucky Charm Values)} \\ + \text{(Total Golden Token Points)} \\ + \text{(Total Silver Token Points)} \\ - \text{(Total Red Debt Coins)} \\ \hline \hline = \text{FINAL NET ECO SCORE} \end{array}$$

The Value Index Reference:

- **Lucky Charms (Pendants):** Face value listed on the card (+10 to +20 points).
- **Golden Tokens:**
 - a) Gold Crowns are worth **+7 points** each.
 - b) Gold Checkers are worth **+5 points** each.
- **Silver Tokens:**
 - a) Silver Crowns are worth **+3 points** each.
 - b) Silver Checkers are worth **+1 point** each.
- **Red Debt Coins:**
 - a) Red Crowns subtract **-7 points** each.
 - b) Red Checkers subtract **-3 points** each.

* Live Scoring Demonstration Example:

If a player concludes the game with a Ginkgo Biloba Lucky Charm, four Gold Crowns, one Silver Checker, and one Red Crown loan token, their math maps out as follows:

- *Lucky Charms (Ginkgo Biloba):* **+20 points**
- *Golden Tokens (4 Gold Crowns):* **+28 points**
- *Silver Tokens (1 Silver Checker):* **+1 point**
- *Red Debt Coins (1 Red Crown):* **-7 points**
- *Calculation:* $20 + 28 + 1 - 7 = 42$ net points total.

The player with the highest final net balance earns the ultimate title of:

“The Planet Winner”

because their structural choices helped the Planet the most!



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"CIRCULAR ECONOMY SIMULATOR - 64 STEPS TO BALANCE" (CES 64) is an original educational board game concept created and developed by Theodora Gkika & Aneta Chola.

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