

CARBON CAPTURE, USAGE, AND STORAGE GAME

A colorful, stylized background illustration featuring a blue sky with white and grey clouds. In the foreground, there are green trees and bushes. Behind them is a range of mountains with blue peaks and white snow. To the right, there's a city skyline with various buildings, including a tall red and white striped tower and several grey skyscrapers.

**Computer Simulation & Gaming (CSG)
Student Development Project**

PROJECT SUMMARY



The **Untitled CCUS Project** is an **educational simulation game** designed to teach players about **carbon emissions** and **climate change** solutions through **engaging gameplay**.

Developed by **Computer Simulation & Gaming (CSG)** majors at the **University of Tulsa**, this game aims to **raise awareness** and inspiring **sustainable action**, all within a quick, **impactful learning** module.

UNTITLED CCUS GAME

“ Will you rise to the challenge, or will history repeat itself?

The fate of the city—and the planet—is in your hands.

Strategize, manage, and transform to build
a sustainable future or face the consequences. ”



GOALS

📌 Engage & Educate

Transform complex concepts of **CCUS** into an **interactive and immersive gameplay experience**.

👥 Engaging for All

Educational content is designed for **young learners**, with **intuitive mechanics** that appeal to a broader audience.

🌐 Real-World Impact

Empower players to strategize **real-world CCUS solutions** fostering **critical thinking** and **awareness of climate challenges**.

🚀 Sustainable Futures

Inspire players to reflect on their **own communities** and develop **better habits** for building a **more sustainable future**.

EDUCATIONAL VALUE

- 🌐 **Learn about CCUS Technologies:** Introduces children to current and future **carbon capture solutions** and their potential impact on the environment.
- ⚖️ **Understand the Balance:** Explores the trade-offs between **sustainability, cost, and community happiness**, showing real-world decision-making.
- 💡 **See the Consequences:** Demonstrates the **effects of carbon emissions** and the importance of **reducing emissions** for a sustainable future.
- 🌱 **Supports UN Sustainability Goals:** Targets [Goal 13 \(Climate Action\)](#) and [Goal 11 \(Sustainable Cities and Communities\)](#) by empowering players to develop sustainable strategies for the future.





UN SUSTAINABLE DEVELOPMENT GOALS



SDG 13: Climate Action

Focus on **reducing carbon emissions** through **CCUS technologies**.

Highlight the urgency of climate action to foster **awareness** of **climate change**.



SDG 11: Sustainable Cities and Communities

Emphasizes building **resilient communities** with a focus on **environmental sustainability**.

Highlights the balance between **urban growth**, **quality of life**, and **reducing environmental impact**.

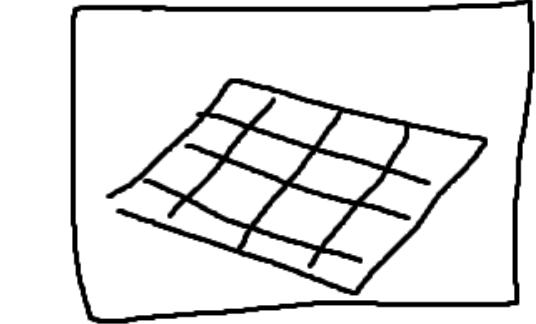
NARRATIVE

- To prevent a **climate disaster**, the player assumes the role of a **Time Traveler**.
- As **City Manager**, they must implement **carbon capture solutions** while balancing **community happiness**.
- With just **20 minutes** to shape **20 years**, every **decision** counts.
- Will the player rise to the **challenge**, or will **history repeat itself**?
- The fate of the **city**—and the **planet**—is in their hands. Build a **sustainable future** or face the consequences.

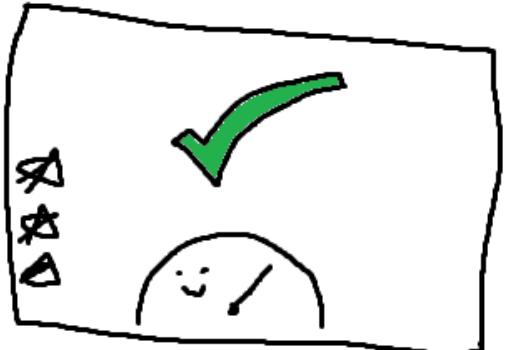
GAMEPLAY

-  Manage **carbon emissions, budgets, and community happiness** in a city-building simulation.
-  **Balance economic growth** with **environmental responsibility**, making decisions that have **real-time consequences**.
-  **Tough choices** like building roads (increasing emissions) versus implementing **CCUS solutions** or planting trees (with a cost).
-  **Community happiness** directly impacts the **budget**, enabling or restricting **carbon capture solutions**.
-  Introduces players to **CCUS strategies**, providing players with the tools to **learn about sustainability**.
-  **20-minute** playthrough designed for quick, impactful learning on balancing growth and sustainability.

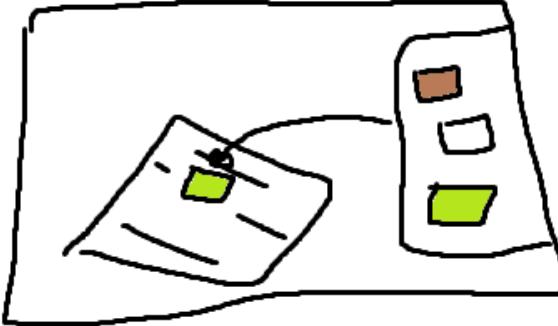
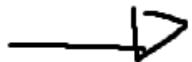
GAMEPLAY LOOP



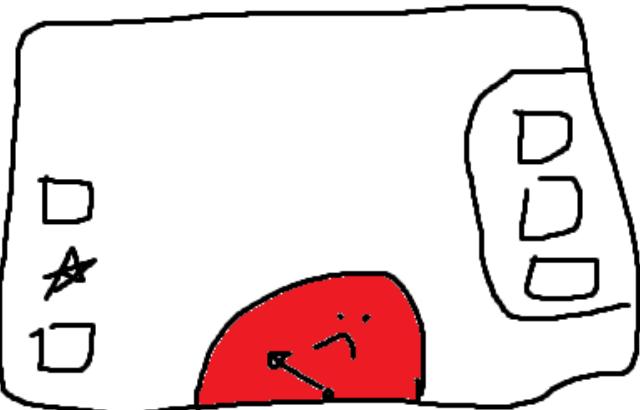
1. Player is given level with preplaced tiles/carbon bar and 3 goals to achieve in level and \$\$\$



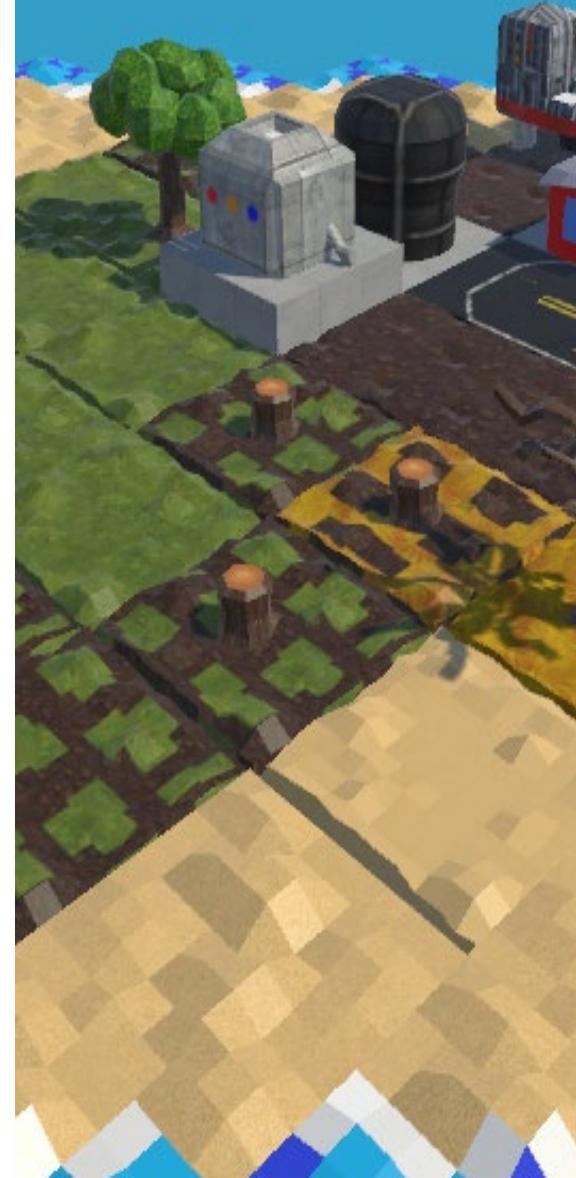
4. Player meets all three goals and win condition is triggered



2. Player purchases tiles and places them down to meet 3 goals



3. The bulk of the level is meeting the 3 goals by interacting with level's income, tiles, and carbon



CURRENT DEVELOPMENT

City-building mechanics: Focus on balancing emissions, budget, happiness, and time.

Emissions, budget, and happiness system: Players can track and manage these key elements in real-time.

Time Traveler narrative: Completed the storyline structure, focusing on climate disaster prevention.

Educational Goals Defined

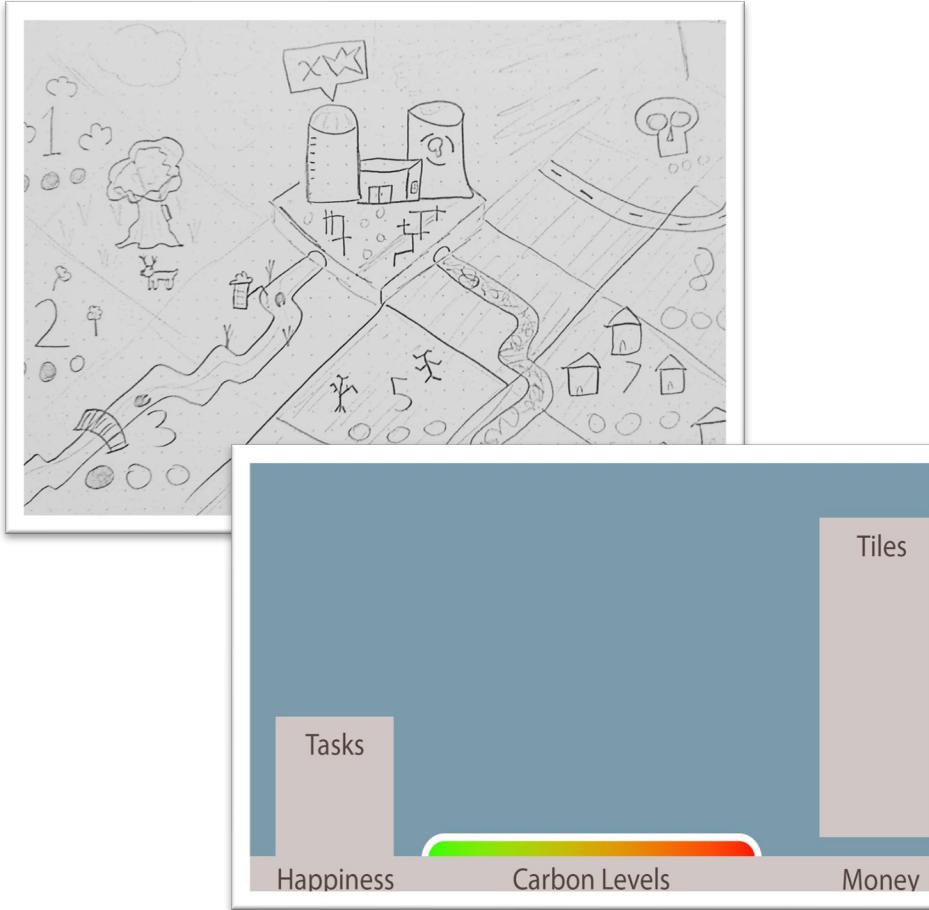
- Initial research on **CCUS technologies** and their real-world applications.
- Defined **educational objectives** for integration.

```
public void Place()
{
    dragging = false; //stops object from following mouse
    transform.position = BuildingSystem.current.SnapCoordinateToGrid(t
    this.GetComponent<Tile>().SetTileState(TileState.Static); //Non fun
    tileMaterialHandler.MaterialSet(TileMaterialHandler.matState.Place
    if (SoundCanBePlayed) { FMODUnity.RuntimeManager.PlayOneShot("even
    if (overlapObject != null) {Destroy(overlapObject);} //the overlapp
    if (GOTag == "Ground")
        Destroy(overlapTerrain); //terrain is only destroyed when p
```

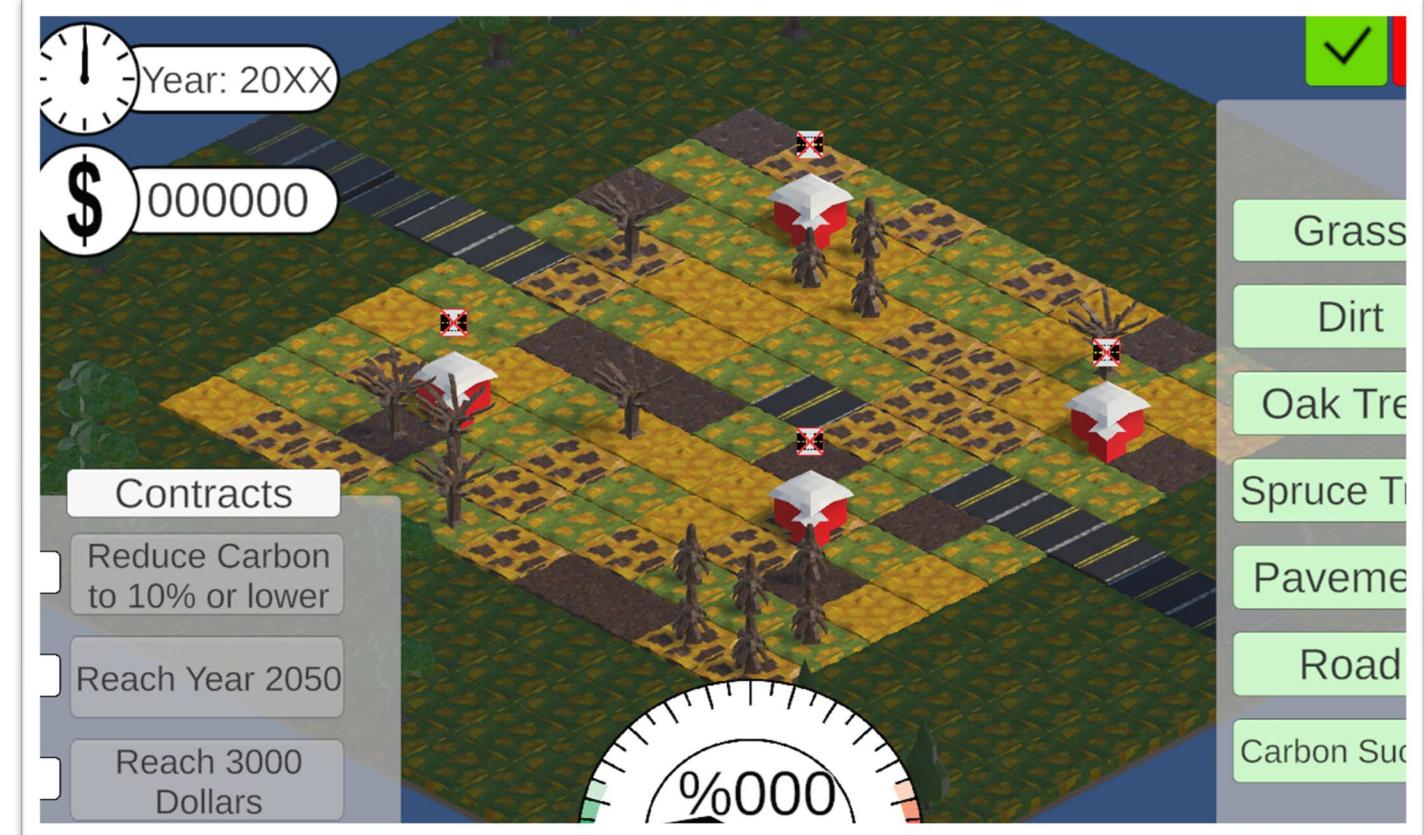


CONCEPT TO PROTOTYPE

Map Concept

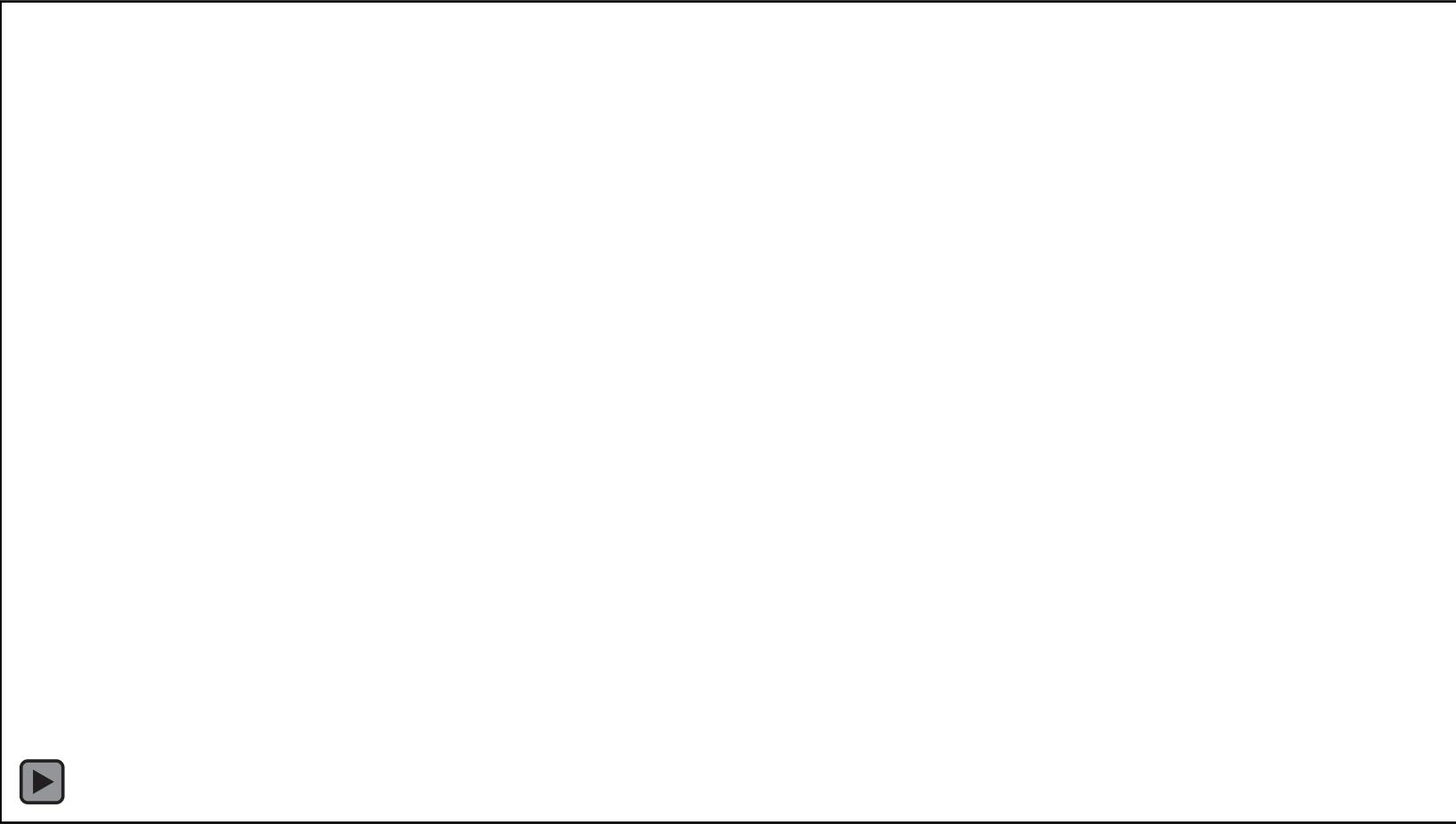


UI Mockup



Playable Prototype

GAMEPLAY TRAILER



https://drive.google.com/file/d/1eumeoiWPMiuRulr5ZdDG_t6GimgIS8OM/view?usp=drive_link

NEXT PHASE

Refining the User Interface (UI)

Improve **layout**, **accessibility**, and **overall user experience** by making menus intuitive and information easy to navigate.

Develop Tutorial & Onboarding

Create a **tutorial** to guide players through mechanics and introduce key concepts and feels like a **natural part of the gameplay**.

Add Animations & Interactivity

Expand **animations** and **interactive elements** to deepen engagement and reinforce key gameplay moments.

Integrate Educational Content

Implement **audio** and **text-based educational content** to teach players about CCUS within the game.

PROJECT CHALLENGES

💻 **Hardware Access:** Many student volunteers lack personal hardware with sufficient specs for Unity development, and available lab equipment isn't dedicated to student research projects.

⌚ **Volunteer Commitment:** As a volunteer project, it struggles with prioritization, leading to inconsistent availability and slower progress from students.

💰 **Limited Funds:** Lack of available funds for purchasing tools, licenses & resources to enhance the game features.





BUDGETARY NEEDS

FUNDING CATEGORY	AMOUNT	DESCRIPTION
Research PCs for Development	\$50,000	Purchase 10 dedicated PCs with necessary specs for game development and research.
Student Compensation	\$15,000	Provide stipends to student volunteers to ensure consistent project dedication.
Development Costs	\$10,000	Fund additional software, tools, and resources needed for refining the game.



Total Requested: \$75,000

PROJECT TEAM



- **Akram Taghavi-Burris - Faculty mentor**
- Blaine Grimes - Game Designer / 3D Modeler
- Ava Boswell – 3D Artist
- Zach Hickman - Developer
- Brooks Mueller – Level Designer
- Chase Mullens – Narrative Design
- Ayden Pingleton – UX Designer
- Christoper Depalma – 2D Artist
- Aidan Pohl - Developer
- Haiying Zeng - Sound Designer & Composer

THANK YOU

For more information about our project and our on-going development please visit the links below:

- [**CCUS Project - GitHub**](#)
- [**CCUS Project on Itch.io**](#)

For additional details please contact

- **Akram Taghavi-Burris (akram-burris@utulsa.edu)**

