Green Campus Simulator – A carbon reducing game

REN Yixiao, YANG Xikun

Problem Existed

Problem 1. Students' lack of awareness

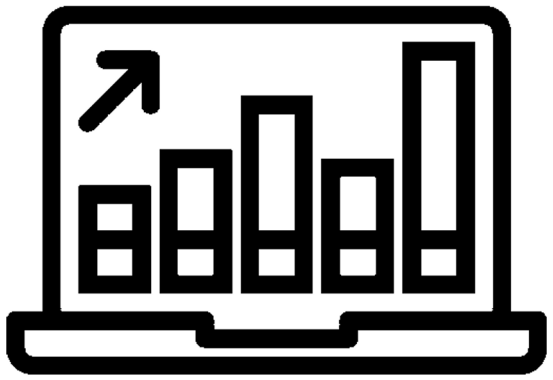
- **Recent studies show that many students are disconnected from the consequences of climate change due to insufficient exposure to its direct impacts** (Smith, 2024).

Problem 2. Limitations of the GreenCoin system

- **The initiative of Green Coin**

- **The Limitations:**
  - Lack of interaction- reducing the user's sense of **usability** and **experience.**
  - **Single collection** method- reducing the audience base.

Our solution : An interesting strategy game



Analysis

- **Problem**
- Low appeal of the GreenCoin system

- **Reason**
  - **Achievement:** Lack of rewarding feeling
  - **Engagement:** No fun or engaging experiences
  - **Competition:** Absence of a leaderboard.

- **Game setting**
  - **Role**: Head of Environmental Department
  - **Objective:** Minimize Carbon Emissions
- **Gameplay**
  - 3yrs office term
  - Monthly budget
  - Take combinations of carbon-reducing measures
- **Why interesting? How challenging?**
  - Combining Strategies Effectively

Green Campus Simulator [[DEMO]]

By REN Yixiao & YANG Xikun

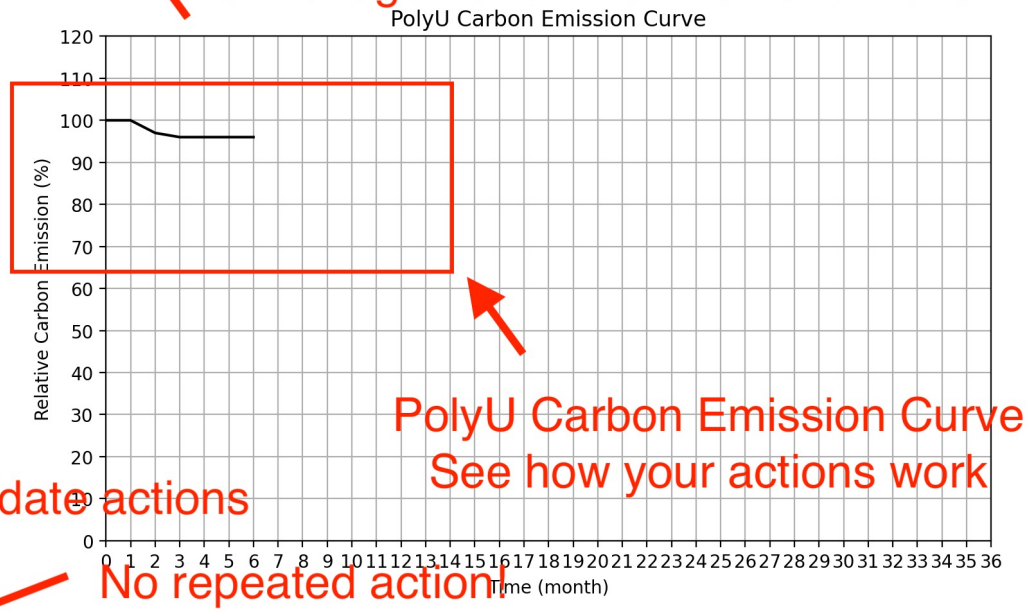
Time: 6 month, 30 months left

Budget: $$ 30

⏸ Pause Game ⏸

Your office term

Your budget for environmental actions



PolyU Carbon Emission Curve
See how your actions work

Your candidate actions

No repeated action!

Log

Month 2, action: Increase all classroom ACs by 1C, cost $$ 0
Month 1, action: Increase all office ACs by 1C, cost $$ 0

== Game to start ==

You are a school manager, and now you have 3.0yrs term.

During your office term, try your best to REDUCE THE CARBON EMISSION on campus as much as possible.

Infrastructure Actions

- Plant plants near car road
- Build carpark
- Use neflective insulation coating for main buildings
- Use nano ceramic coating for main buildings
- Use phase change material (PCM) for main buildings
- (●) Use silicate insulation coating for main buildings
- Use hollow glass microsphere coating for main buildings
- Use vacuum insulation coating for main buildings
- Use polyurethane foam coating for main buildings
- Use infrared reflective coating for main buildings
- Use florocarbon coating for main buildings
- Use graphene insulation coating for main buildings
- Arrange solar panels for some buildings
- Arrange solar panels for all buildings
- Arrange more effective LED for main buildings
- Arrange smart thermostats for main buildings
- Arrange high performance windows for main buildings

Carbon Reducing Actions

- Increase all office ACs by 1C
- Increase all classroom ACs by 1C

Action Information

Using silicate insulation coating on the main buildings of a school can be an effective method to reduce carbon emissions by improving the buildings' energy efficiency. Silicate coatings are known for their excellent thermal insulation properties, which help in minimizing heat transfer through the building envelope. This means that during warmer months, the buildings require less air conditioning to maintain comfortable indoor temperatures, and during colder months, less heating is required.

The reduced demand for heating and cooling directly translates into lower energy consumption. Since energy production, especially in regions dependent on fossil fuels, is a major source of carbon emissions, reducing energy consumption effectively cuts down on these emissions. Additionally, silicate coatings are durable and provide added benefits such as fire resistance and protection against moisture, which can prolong the lifespan of building materials and reduce the need for frequent renovations or repairs.

Overall, applying silicate insulation coating to school buildings not only contributes

Detailed explanation
Educational!

Press this to
act your chosen action

🚀 Act your operation 🚀

With the GreenCoin system

Leaderboards & rewards
Entry tickets
COMPETITION and **INCENTIVE**

Don’t forget real-life eco-friendly actions?!

We use data & professional analysis

Academic research

Campus data and calculations

Highly realistic

Real-life simulator

Detailed science materials

All people, any job, any age

Only gameplay?

Boost students' understanding & awareness

Contribute to a

real green campus

Example

- Air-conditioned office buildings in subtropical Hong Kong use **an average of 270 kWh/m2 per unit gross floor area**, with heating, ventilation, and air conditioning being the major electricity end users. (Li *et al.*, 2020)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	**Electricity Consumption of PolyU Main Campus Buildings / kWh**																
2																	
3	**Month**	**Ph 1 (CDEFJ Wing), Library**	**Ph 2 (VA, VS), FSCH**	**Ph 2AB (GH Wing), GH Annex**	**Ph 3A (AG, BC Wing)**	**Ph 3B (QTS Wing)**	**Ph 4A/IC (Core U, W / IC)**	**Ph 5 (PQ Wing)**	**Ph 6 (Block M)**	**JCA**	**Core R**	**Ph 7 (Block Y)**	**Block V (JCIT)**	**Ph 8 (Block Z)**	**Block X**	**Data Centre (P404)**	**Grand Total**
4	**Jan-21**	833,183	217,940	448,782	337,961	354,047	475,895	114,719	309,593	43,838	132,799	633,160	284,715	677,009	133,453	185,999	**5,183,092**
5	**Feb-21**	833,226	196,915	461,776	322,101	348,256	456,112	105,258	309,514	44,510	134,154	780,611	358,393	793,801	150,134	183,647	**5,478,407**
6	**Mar-21**	1,126,081	248,206	579,026	412,792	449,057	613,902	179,002	320,759	48,974	150,772	745,397	334,545	761,159	166,889	159,419	**6,295,979**
7	**Apr-21**	1,152,330	246,480	653,711	412,931	459,080	670,806	191,353	363,227	53,119	174,934	868,637	385,891	870,795	194,354	158,915	**6,856,562**
8	**May-21**	1,219,074	225,938	810,961	470,205	522,989	796,049	202,608	486,819	73,202	252,750	1,060,396	459,434	1,058,368	242,084	170,004	**8,050,881**
9	**Jun-21**	1,457,445	269,206	1,067,764	568,531	617,823	1,023,281	236,107	503,195	83,953	290,785	1,171,830	507,142	1,154,010	274,303	190,493	**9,415,866**
10	**Jul-21**	1,333,286	249,626	1,034,204	524,982	581,642	963,984	238,692	461,902	72,204	294,728	1,105,804	472,141	1,092,713	204,163	157,188	**8,787,259**
11	**Aug-21**	1,396,934	262,848	1,043,174	525,882	674,579	978,412	261,531	546,185	80,977	355,159	1,266,971	518,328	1,214,222	218,613	155,141	**9,498,956**
12	**Sep-21**	1,367,649	281,679	1,111,468	560,163	706,436	1,048,016	277,425	502,767	77,021	313,451	1,218,924	525,836	1,216,157	245,974	147,860	**9,600,825**
13	**Oct-21**	1,136,662	251,892	848,358	440,214	556,340	789,400	227,749	447,758	71,257	263,299	985,273	427,623	996,667	224,770	152,357	**7,819,619**
14	**Nov-21**	1,178,837	269,455	711,803	426,525	549,493	712,541	225,719	389,440	71,624	200,654	920,349	423,138	1,007,438	222,551	173,195	**7,482,762**
15	**Dec-21**	893,718	235,653	604,154	379,095	500,681	545,808	166,076	313,134	52,152	142,212	742,049	349,390	841,786	191,671	205,655	**6,163,233**

Future Potential

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Strategic Promotion Platform

- **Platform Potential:** The game work as a tool for promoting sustainability and increasing student engagement in environmental activities.

Increase Awareness and Participation in Environmental Activities

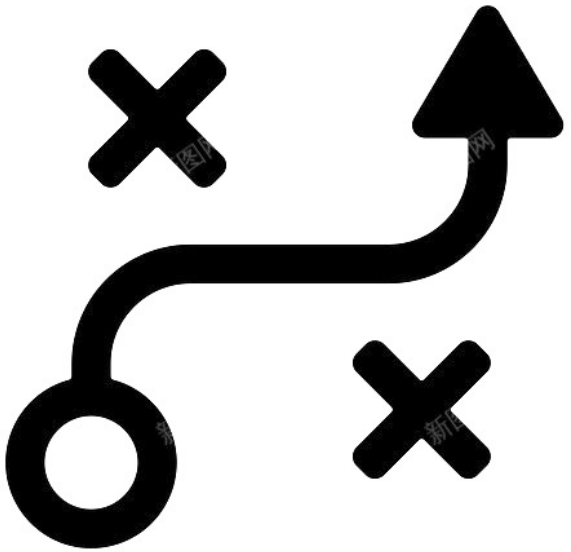
- **We plan to engage more students in school environmental activities through gaming.**
- Traditional email notifications often fail to catch sufficient attention.
- The interactive and fun nature of the gaming platform will significantly boost student interest and participation in topics like sustainability and carbon emissions, **thereby deepening their awareness and knowledge of environmental issues.**

Establish an Inter-School Interaction Platform

- Using this gaming platform, we communicate & collaborate with other schools that have similar green initiatives.
- By sharing virtual environments and interactive games, schools can exchange green strategies and practices on a broader platform, which will further advance environmental education.

Serve the Green Finance Industry

- We can use the gaming platform as a reference tool for green finance, allowing users to import different maps and set specific parameters to simulate and optimize green strategies in business environments.
- This will provide a science and data-driven tool to help businesses understand and implement green finance strategies, optimizing their environmental responsibilities and economic benefits.



Neither the GreenCoins nor the game is our goal.

- A greener campus is.

Thanks for listening.