AC1 Informing Ideas

Response to Brief

The Brief has asked me for a digital animation, game or experience that promotes energy conservation and the awareness of energy consumption. It is for all/any ages, and must be completed in a game engine such as Unity or Unreal.
While I have experience in both Unity and Unreal, I will be using Unity 3D for this project, as I personally prefer C#, as opposed to Unreal's Blueprint system or C++. It also provides a lot more tools for lo-poly models as it has a lot more downloadable packs on the Unity Asset Store.
My initial idea was a tycoon/builder game which encourages learning statistics and facts about green energy solutions such as wind turbines, and needs strategic thinking to place energy sources in the correct position.

E.ON Research

Facts about climate change

- https://climate-change.data.gov.uk/
- The average temperature in the UK has increased by 1 degree centigrade since 1980
- The use of carbon-based fuels has gone down from 215.86 Mtoe to 134.84 Mtoe since 1990

What has E.ON been doing to help?

- https://www.eonenergy.com/sustainable-businesses.html
- https://www.eon.com/en/business-customers/success-stories/marks-spencer.html
- They have started using their Building energy Management Systems (BeMS) and Heating Ventilation & Air Conditioning (HVAC) systems. This reduced M&S' energy consumption by 34%.
  E.ON has also been attempting to decrease energy usage in homes. They sell solar panels to home-owners as well as businesses, and teach people about ways to decrease your energy usage in a smart way (I.E. using insulation, energy efficient boilers.)
  They also provide a supply of 100% renewable electricity through E.ON Next, for businesses as well as homes.

E.ON specifically are supplying EV charging solutions, to help increase the usage of electric vehicles. They are also partnering with Nissan to invest in V2G, which allows energy to be transferred to nearby buildings from EV batteries.

Game Research

- Factorio
  Factorio is a sandbox game in which you build massive factories using conveyor belts and automated technology.The main progression is a very large tech tree of more and more complicated automation features, such as conveyor splitters, insertion arms, worker robots, logistic robots, etc.
  Clean energy comes into play when you have a large enough factory. Large factories create a lot of pollution around the area, and this is visually represented by green water, dust clouds, and different ground textures.
  Pollution is an important mechanic as well, as it attracts enemies such as Biters and Spitters which will attempt to destroy the largest source of pollution nearby. This means that you need to create automated defense systems in the form of protective walls, and turrets that need to stay fed with ammunition.
  This adds to the game as there is an extra layer of thought added to your factory expansion, and the threat of enemies is always looming.
- Cities Skylines
  Cities: Skylines is a sandbox game about building your own city, similar to SimCity and Tropico. However, it also makes you manage infrastructure such as energy, waste disposal and water pipes.
  Citizens will become unhappy if they are placed too close to an industrial zone, or if they have no access to basic services. There is also a negative penalty for using fossil fuel power stations instead of green solutions.
  Waste that is dumped into the water will pollute it, and make citizens unhappy. All of this combines to make a game where clean, green energy is extremely important and it teaches players about many negative aspects of fossil fuels and unsustainable energy management.
  I enjoyed this game as there were a lot of things to think about while building your city, and there were a lot of well designed mechanics. It also allowed a lot of player expression as you could shape the city yourself using roads and zone different areas (Commercial, Industrial and Residential).
- Terra Nil

Terra Nil is a game set in the near future, where you are tasked with making earth back into a habitable enviroment after it has been destroyed by harvesting energy. You do this by placing structures that add life back to the world, such as irrigation and climate control tech. There is also a mechanic of biodiversity, so you need to have an equal amount of different biomes to keep the animals alive. At the end of the game, you need to pack up all of your structures and leave the planet. This is easier said than done as you need to use monorail connections and drones in order to do this.
I enjoyed this game, however there was a lot going on and the tutorial was quite condensed and taught you a lot very quickly.
While it's a fun puzzle game, i think it may have too many mechanics and different things to think about. it can get confusing pretty quick. There were also some redundant features that didnt add to the gameplay much, such as the stored energy mechanic. It is meant to limit how many objects you can place down, but there are already mechanics to do that, and it didnt add much to the game as a whole.
My favourite part was the graphics. It used a large contrast between the environment to show where live was flourishing, and where it was still dead and barren.

- Green with Energy
  Green with Energy is a puzzle game in which you need to supply houses with energy using green solutions such as wind turbines and solar panels. You need to think about different voltages, and the day-night cycle of energy.
  For example, solar panels arent enough to power a house alone, as during the night they dont give off any power. To fix this, you would need to add a battery plant that can store power and give it off when needed. You also need to transform high-voltage into low-voltage before connecting power to a house.
  It also rewards efficiency in your plans as you have a budget and everything you place costs money.
  The full game isn't out yet, however it's promising and could be a fun puzzle game. I did notice a few bugs / unfinished features which is normal for a pre-release demo.

AC2 Problem Solving

To begin I generated some ideas that take inspiration from the games I researched in the AC1 Informing Ideas. I wanted to take the parts of each game that I enjoyed, while trying to fix the issues I had with them.

Game Ideas

Idea 1:

- Sandbox game, similar to Factorio.
- Auto-building city every interval, increasing energy demands and game difficulty
- You need to build energy infrastructure and plants in order to supply energy around the city.
- Meanwhile keeping the inner city non-polluted and green.
- Difficulty of the game will be trying to keep energy demand satisfied, while keeping infrastructure and energy-creating structures away from the center of the city.

Idea 2:

- simple tile-based building game in which you create a power grid
- increasing energy demands over time
- playing within a space constraint that expands by selling excess energy for money
- Ideal placements of wind, solar panels, etc. based on each tiles wind speed, sunlight hours, etc.

Idea 3:

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Game Design Document

Overview/Pitch

Energy is an Isometric, tile-based strategy game in which you have to adapt to an increasing energy demand by building green energy solutions and searching the environment.

Mechanics

You begin with a 16x16 grid, with different wind speeds, daylight hours, and geothermal readings. You have to find the perfect place to locate each structure to make the most energy possible.

You have a base energy demand that you must meet, and any additional energy created can be exported for money.
Money allows you to increase the map size, in order to find new tiles to build on.

Structures

Since the game needs to be endless, energy accumulates over time depending on how many structures you have built. Therefore, the game is not able to be lost, as you will always have some kind of energy generation. However the game is a closed loop, as once you have dicovered the entire map
Energy generators (Wind Turbines, Solar Panels) are 100 energy a tick, multiplied by the Wind stat of the current tile it's on.

Map

I have decided that random generation will be a good fit for this game. This is because it increases replay value as the map is different each time, as well as adding a random element that spices the game up. The world will be made up of tiles in a grid system, each with their own wind speeds and daylight hours, as well as building cost. You will be able to toggle different information overlays through the UI. These stats will influence the amount of power that any structure on that tile will output.

Camera

I will use a 3D Isometric view for this game, as it mimicks other factory/building games I have researched.

Visual Style

Since it will be a 3D game, I need a relatively fast and convienient way to create models for the game. If I went for realism, I would probably take lots of time that I could spend on more important things. Therefore, I will go with low-poly modelling.